LICENSE RENEWAL APPLICATION

OYSTER CREEK GENERATING STATION

DOCKET No. 50-219

Facility Operating License No. DPR-16

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1.0 ADMINISTRATIVE INFORMATION

1.1 GENERAL INFORMATION - 10 CFR 54.19

1.1.1 NAME OF APPLICANT

AmerGen Energy Company (AmerGen), LLC, hereby applies for a renewed operating license for Oyster Creek Generating Station (OCGS).

1.1.2 ADDRESS OF APPLICANT

AmerGen Energy Company, LLC
200 Exelon Way
Kennett Square, PA 19348

1.1.3 DESCRIPTIONS OF BUSINESS OR OCCUPATION OF APPLICANT

AmerGen Energy Company, LLC is a limited liability company formed to own, operate, and acquire nuclear and other electric generating stations; to engage in the sale of electrical energy; and to perform other business activities. AmerGen Energy Company, LLC is a wholly owned subsidiary of Exelon Generation Company, LLC, a Delaware limited liability company which is wholly owned by Exelon Ventures Company, a Delaware limited liability company, which in turn is wholly owned by Exelon Corporation, a corporation formed under the laws of the Commonwealth of Pennsylvania. AmerGen Energy Company, LLC is the licensed operator of Oyster Creek Generating Station, which is the subject of this application. The current Oyster Creek Generating Station operating license (Facility Operating License No. DPR-16) expires at midnight on April 9, 2009. AmerGen Energy Company, LLC will continue as the licensed operator on the renewed operating license.

1.1.4 DESCRIPTIONS OF ORGANIZATION AND MANAGEMENT OF APPLICANT

AmerGen Energy Company, LLC

AmerGen Energy Company (AmerGen), LLC is organized under the laws of the State of Delaware. AmerGen Energy Company, LLC's principal place of business is in the Commonwealth of Pennsylvania. Exelon Ventures Company is a Delaware limited liability company and Exelon Corporation is a corporation organized under the laws of the Commonwealth of Pennsylvania with their headquarters and principal places of business in Chicago, Illinois. Exelon Corporation is a publicly traded corporation whose shares are widely traded on the New York Stock Exchange. Exelon Ventures Company is a wholly owned subsidiary of Exelon Corporation. With one exception all of the directors, management committee members, and principal officers of AmerGen Energy Company, LLC, Exelon

Ventures Company, and Exelon Corporation are U.S. citizens. Neither AmerGen Energy Company, LLC nor its parents, Exelon Ventures Company or Exelon Corporation, is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. The principal officers of AmerGen Energy Company, LLC, and their addresses, are presented below:

Principal Officers (AmerGen Energy Company, LLC)		
Name	**Title**	**Address**
Robert S. Bement	Site Vice President, Clinton	Clinton Power Station Clinton, IL 61727
Jeffrey A. Benjamin	Vice President, Licensing and Regulatory Affairs	4300 Winfield Road Warrenville, IL 60555
Thomas Coutu	Vice President of Midwest Operations	4300 Winfield Road Warrenville, IL 60555
Martin J. Coveney	Vice President	4300 Winfield Road Warrenville, IL 60555
Christopher M. Crane	President, CEO and Chief Nuclear Officer	4300 Winfield Road Warrenville, IL 60555
Edward J. Cullen, Jr.	Secretary	2301 Market Street Philadelphia, PA 19101
Richard P. Lopriore	Senior Vice President of Mid-Atlantic Operations	200 Exelon Way Kennett Square, PA 19348
J. Barry Mitchell	Treasurer	10 South Dearborn Street Chicago, IL 60603
Thomas S. O'Neill	Assistant Secretary	4300 Winfield Road Warrenville, IL 60555
Michael Pacilio	Senior Vice President, Business Operations, Mid-West PWR Operations	4300 Winfield Road Warrenville, IL 60555
Charles G. Pardee	Senior Vice President	4300 Winfield Road Warrenville, IL 60555
George R. Shicora	Assistant Treasurer	2301 Market Street Philadelphia, PA 19101
Diana B. Sorfleet	Vice President, Human Resources	4300 Winfield Road Warrenville, IL 60555
Kevin D. Stepanuk	Assistant Secretary	2301 Market Street Philadelphia, PA 19101
Bud N. Swenson	Site Vice President, Oyster Creek	Oyster Creek Generating Station P.O. Box 388 Forked River, NJ 08731
Charles S. Walls	Assistant Treasurer	10 South Dearborn St. Chicago, IL 60603
Russell G. West	Site Vice President, Three Mile Island	Three Mile Island Rt 441S Middletown, PA 17057

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

AmerGen Energy Company, LLC requests renewal of the Class 104 operating license for Oyster Creek Generating Station, (License No. DPR-16) for a period of 20 years beyond the expiration of the current license, midnight on April 9, 2009.

Because the current licensing basis is carried forward with the possible exception of some aging issues, AmerGen Energy Company, LLC expects the form and content of the license to be generally the same, as they now exist. In this application, AmerGen Energy Company, LLC also requests the renewal of specific licenses under 10 CFR Parts 30, 40, and 70 that are contained in the current operating license.

1.1.6 EARLIEST AND LATEST DATES FOR ALTERATIONS, IF PROPOSED

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

1.1.7 RESTRICTED DATA

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

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

1.1.8 REGULATORY AGENCIES

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

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

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

1.1.9 LOCAL NEWS PUBLICATIONS

News publications in circulation near Oyster Creek that are considered appropriate to give reasonable notice of the application are as follows:

Lacey Beacon
345 East Bay Ave
Manahawkin, New Jersey 08050
Tel. (609) 978-4540

Atlantic City Press
185 North Main St.
Manahawkin, New Jersey 60481
Tel. (609) 978-2011

Asbury Park Press
3601 Highway 66
PO Box 1550
Neptune, New Jersey 07754
Tel. (732) 922-6000

1.1.10 CONFORMING CHANGES TO STANDARD INDEMNITY AGREEMENT

10 CFR 54.19(b) requires that “each application must include conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license.” The current indemnity agreement (No. B-37) for Oyster Creek states in Article VII that the agreement shall terminate at the time of expiration of the licenses specified in Item 3 of the Attachment to the agreement. Item 3 of the Attachment to the indemnity agreement lists license number, DPR-16. Applicant requests that any necessary conforming changes be made to Article VII and Item 3 of the Attachment, and any other sections of the indemnity agreement as appropriate to ensure that the indemnity agreement continues to apply during both the terms of the current license and the terms of the renewed license. Applicant understands that no changes may be necessary for this purpose if the current license number is retained.

1.2 GENERAL LICENSE INFORMATION

1.2.1 APPLICATION UPDATES, RENEWED LICENSES, AND RENEWAL TERM OPERATION

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

In accordance with 10 CFR 54.37(b), AmerGen Energy Company, LLC will maintain a summary list in the Oyster Creek Generating Station Updated Final Safety Analysis Report (UFSAR) of activities that are required to manage the effects of aging for the systems, structures or components in the scope of license renewal during the period of extended operation and summaries of the time-limited aging analyses evaluations.

1.2.2 INCORPORATION BY REFERENCE

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

1.2.3 CONTACT INFORMATION

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

Pamela B. Cowan
Director – Licensing and Regulatory Affairs
AmerGen Energy Company, LLC
200 Exelon Way
Kennett Square, PA 19348

with copies to:

Frederick W. Polaski
Manager License Renewal
Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

Donald B. Warfel
License Renewal Project Engineer
Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

1.3 PURPOSE

This document provides information required by 10 CFR 54 to support the application for a renewed license for Oyster Creek Generating Station. The application contains technical information required by 10 CFR 54.21 and environmental information required by 10 CFR 54.23. The information contained herein is intended to provide the NRC with an adequate basis to make the finding required by 10 CFR 54.29.

1.4 DESCRIPTION OF THE PLANT

The Oyster Creek Generating Station (OCGS) is a single unit facility. It is located in Lacey Township, Ocean County, New Jersey, approximately two miles south of the community of Forked River, about two miles inland from the shore of Barnegat Bay and seven miles west-north-west of Barnegat Light. The site, about 800 acres, is approximately nine miles south of Toms River, New Jersey, about fifty miles east of Philadelphia, Pennsylvania, and sixty miles south of Newark, New Jersey.

Initial criticality was achieved on May 3, 1969 and Oyster Creek Generating Station was placed in commercial operation on December 23, 1969 under a Provisional Operating License. On July 2, 1991, the NRC issued a Full Term Operating License (Facility Operating License No. DPR-16) which superseded the Provisional Operating License in its entirety. On August 8, 2000, Oyster Creek Generating Station was acquired by and the license transferred to AmerGen. The License permits steady-state reactor core power levels not in excess of 1930 megawatts (thermal) and is in effect until midnight on April 9, 2009.

The reactor is a single cycle, forced circulation boiling water reactor (BWR-2) with a Mark 1 type Containment. The reactor produces steam for direct use in the steam turbine. The primary containment is of the Mark 1 design that consists of a drywell, a suppression chamber in the shape of a torus and a connecting vent system between the drywell and the suppression chamber.

1.5 APPLICATION STRUCTURE

This license renewal application is structured in accordance with Regulatory Guide 1.188, “Standard Format and Content for Applications to Renew Nuclear Plant Operating Licenses,” and NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule”, Revision 5. In addition, Section 3, Aging Management Review Results and Appendix B, Aging Management Programs and activities are structured to address the guidance provided in the Draft NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants”, January 2005. Draft NUREG-1800 references Draft NUREG-1801, “Generic Aging Lessons Learned (GALL) Report”, January 2005.

As an aid to the reviewer, electronic versions of the application contain marked hypertext, which provide links to the referenced sections.

The application is divided into the following major sections:

Section 1 – Administrative Information

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

Section 2 – Structures and Components Subject To Aging Management Review

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

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

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

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

Section 3 – Aging Management Review Results

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

Aging management review results are presented in tabular form, in a format in accordance with Draft NUREG-1800, "Standard Review Plan for Review of License Renewal Applications", January 2005. For mechanical systems, aging management review results are provided in Sections 3.1 through 3.4 for the reactor vessel, internals, and reactor coolant system, engineered safety features systems, auxiliary systems, and steam and power conversions systems. Aging management review results for containments, structures, and component supports are provided in Section 3.5. Aging management review results for electrical and instrumentation and controls are provided in Section 3.6.

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

Section 4 – Time-Limited Aging Analyses

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

Appendix A –Updated Final Safety Analysis Report Supplement

As required by 10 CFR 54.21(d), the Updated Final Safety Analysis Report (UFSAR) supplement contains a summary of activities credited for managing the effects of aging for the period of extended operation. In addition, summary descriptions of time-limited aging analyses evaluations are provided.

Appendix B – Aging Management Programs

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

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

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

Appendix C – Commodity Groups (Optional)

Appendix C is not used.

Appendix D – Technical Specification Changes

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

Appendix E – Environmental Information – Oyster Creek Generating Station

This Appendix satisfies the requirements of 10 CFR 54.23 to provide a supplement to the environmental report that complies with the requirements of subpart A of 10 CFR Part 51 for Oyster Creek.

1.6 ACRONYMS

Acronym	Meaning
ACAD	Atmospheric containment air dilution system
ADS	Automatic depressurization system
AFU	Air filtration unit
AHU	Air handling unit
AMP	Aging management program
AMR	Aging management review
ARI	Alternate rod injection
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	Anticipated transients without scram
BWR	Boiling water reactor
BWRVIP	Boiling Water Reactor Vessel and Internals Project
CAM	Containment atmospheric monitoring (system)
CAPGRMS	Containment atmosphere particulate and gaseous radioactivity monitor system
CASS	Cast austenitic stainless steel
CCST	Contaminated condensate storage tank
CCSW	Containment cooling service water
CFR	Code of Federal Regulations
CIS	Containment inerting system
CL2	Chlorination system
CLB	Current licensing basis
CNDS	Condensate system
CRD	Control rod drive
CRDS	Control rod drive system
CRDA	Control rod drop accident
CRDM	Control rod drive mechanism
CS	Core spray
CST	Condensate storage tank
CT	Condensate transfer
CUF	Cumulative usage factor
CVB	Containment vacuum breaker
CWS	Circulating water system

Acronym	Meaning
DBA	Design basis accident
DBD	Design basis document
DBE	Design basis event
DFED	Drywell floor and equipment drains
DG	Diesel generator
DNI	Drywell nitrogen inerting
DW	Domestic water
DWD	Domestic water distribution
ECCS	Emergency core cooling systems
EDG	Emergency diesel generator
EFPY	Effective full-power years
EPRI	Electric Power Research Institute
EQ	Environmental qualification
ESF	Engineered safety feature
ESW	Emergency service water
FAC	Flow accelerated corrosion
FDSAR	Facility Description and Safety Analysis Report
FFW	Final feedwater facility
FHAR	Fire Hazards Analysis Report
FS	Feedwater system
FSSD	Fire safe shutdown
FWRV	Feedwater regulating valve
GALL	Generic aging lessons learned
GL	Generic Letter
HCU	Hydraulic control unit
HELB	High energy line break
HEPA	High efficiency particulate air
HPCI	High pressure coolant injection (system)
HRSS	High radiation sampling system
HVAC	Heating, ventilation, and air conditioning
HVC	Hardened vent system
HX	Heat exchanger
I & C	Instrumentation and controls
IASCC	Irradiation assisted stress corrosion cracking
ICS	Isolation condenser system

Acronym	Meaning
IEEE	Institute of Electrical and Electronics Engineers
IGSCC	Intergranular stress corrosion cracking
IN	Information Notice
INPO	Institute of Nuclear Power Operations
IPA	Integrated plant assessment
IRM	Intermediate range monitoring
ISI	Inservice inspection
IST	Inservice testing
LER	Licensee event report
LLRT	Local leak rate test
LOCA	Loss of coolant accident
LPCI	Low pressure coolant injection (system)
LPRM	Local power range monitor
LRA	License renewal application
MCAS	Main generator and auxiliary system
MCC	Motor control center
MFED	Miscellaneous floor and equipment drain
MG	Motor generator
MIC	Microbiologically influenced corrosion
MOV	Motor-operated valve
MSS	Main steam system
MSV	Main stop valve
MSIV	Main steam isolation valve
MTAS	Main turbine and auxiliary systems
MUD	Makeup demineralizer
NBI	Nuclear boiler instrumentation
NCAD	Nitrogen containment atmospheric dilution
NDE	Nondestructive examination
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NMMS	Noble metals monitoring system
NRC	Nuclear Regulatory Commission
NRW	New radwaste
NRWSW	New radwaste service water
OCGS	Oyster Creek Generating Station

Acronym	**Meaning**
OE	Operating experience
ORW	Old radwaste
P&ID	Piping and instrumentation diagram
PASS	Post accident sampling system
PCIS	Primary containment isolation system
PM	Preventive maintenance
P-T curves	Pressure-temperature limit curves
PUA	Plant-unique analyses
RAGEMS	Radioactive gaseous effluent monitoring system
RB	Reactor building
RBCCW	Reactor building closed cooling water
RBVS	Reactor building ventilation system
RCIC	Reactor core isolation cooling (system)
RCPB	Reactor coolant pressure boundary
RCS	Reactor coolant system
RDODS	Roof drains and overboard discharge system
RFED	Reactor building floor and equipment drains
RFP	Reactor feed pump
RG	Regulatory guide
RHCS	Reactor head cooling system
RHR	Residual heat removal (system)
RHRSW	Residual heat removal service water
RMCS	Reactor manual control system
RMS	Radiation monitoring system
RPS	Reactor protection system
RPV	Reactor pressure vessel
RR	Reactor recirculation
RT_{NDT}	nil-ductility transition reference temperature
RVWLIS	Reactor vessel water level instrumentation system
RWM	Rod worth minimizer
RWCU	Reactor water cleanup system
SCS	Shutdown cooling system
SLCS	Standby liquid control system
SBO	Station blackout
SCC	Stress corrosion cracking

Acronym	Meaning
SFPCS	Spent fuel pool cooling system
SGTS	Standby gas treatment system
SJAE	Steam jet air ejector
SRM	Source range monitor
SRV	Safety relief valve
SSCs	Systems, structures, and components
SSE	Safe shutdown earthquake
SV	Safety valve
SWS	Service water system
TB	Turbine building
TBCCW	Turbine building closed cooling water
TCV	Turbine control valve
TID	Total integrated dose
TIP	Traveling in-core probe
TLAAs	Time-limited aging analyses
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate heat sink
USE	Upper-shelf energy
WD	Demineralizer water transfer

1.7 GENERAL REFERENCES

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

1.7.2 NEI 95-10, “Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” Revision 5, January 2005.

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

1.7.4 NUREG-1800, Draft “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants” United States Nuclear Regulatory Commission, January 2005.

1.7.5 NUREG-1801, Draft “Generic Aging Lessons Learned (GALL) Report,” United States Nuclear Regulatory Commission, January 2005.

1.7.6 10 CFR 50.48, “Fire Protection.”

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

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

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

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

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

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

1.7.13 NUREG-0800, Section 9.5.1, Appendix C, Supplemental Fire Protection Review Criteria for License Renewal, Revision 4, October 2003

1.7.14 Letter dated December 3, 2002, from NRC to NEI, “Interim Staff Guidance (ISG)-04: Aging Management Of Fire Protection Systems For License Renewal”

1.7.15 NUREG-0933, A Prioritization of Generic Safety Issues, U.S. Nuclear Regulatory Commission, August 2004.

1.7.16 EPRI Technical Report 1003056, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 3.

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

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

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

The scoping and screening methodology is consistent with the guidelines presented in NEI-95-10, Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule, Rev. 5 (reference 1.7.2). The plant level scoping results identify the systems and structures within the scope of license renewal in Section 2.2. The screening results identify structures and components subject to aging management review in the following LRA sections:

- Section 2.3 for mechanical systems
- Section 2.4 for structures
- Section 2.5 for electrical and instrumentation and controls (I&C) systems.

2.1 SCOPING AND SCREENING METHODOLOGY

2.1.1 INTRODUCTION

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

The methodology began with scoping. The initial step in the scoping process was to define the entire plant in terms of systems and structures. These systems and structures were evaluated against the scoping criteria in 10 CFR 54.4(a)(1), (a)(2), and (a)(3), to determine if they perform or support a safety related intended function, or perform functions that demonstrate compliance with the requirements of one of the five license renewal regulated events. For the systems and structures determined to be in scope, the intended functions that are the bases for including them in scope were also identified. Scoping evaluations are documented on a scoping evaluation form.

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

All electrical components within in-scope mechanical and electrical systems were included in the scope of license renewal as electrical commodities. Consequently, further system evaluations to determine which electrical components were required to perform or support the system intended functions were not required. Additional details on electrical and I&C system scoping are provided in Section 2.1.5.

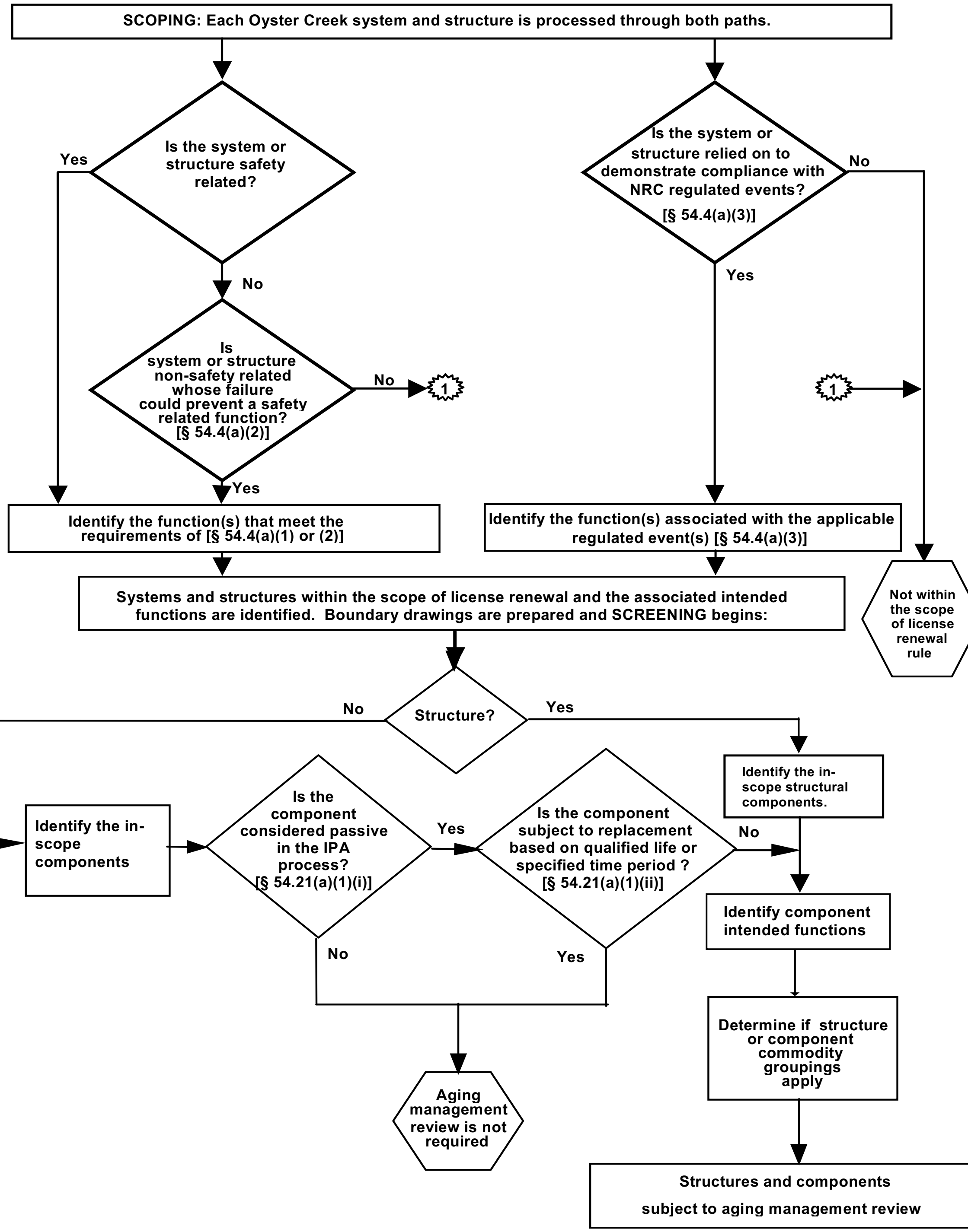
After completion of the scoping and boundary evaluations, the screening process evaluated the in-scope structures and components to identify the long-lived, passive structures and components subject to an aging management review, along with the structure and component passive intended functions. Additional details on the screening process are provided in Section 2.1.6.

Selected components, such as equipment supports and passive electrical components, were more effectively scoped and screened as commodities. As such, they were not evaluated with the individual system or structure, but were evaluated collectively as a commodity group. Commodity groups are identified in

Table 2.2-1. The passive electrical commodities are identified in Section 2.5. Commodity groups utilized are consistent with NUREG-1800 Table 2.1-5 and previous license renewal applications accepted by the NRC.

Figure 2.1-1 provides a flowchart of the general scoping and screening process.

FIGURE 2.1-1
Oyster Creek Scoping and Screening Flowchart



2.1.2 INFORMATION SOURCES USED FOR SCOPING AND SCREENING

A number of different current license basis (CLB) and design basis information sources were utilized in the scoping and screening process. The CLB for Oyster Creek is consistent with the definition provided in 10 CFR 54.3. The significant source documentation is discussed below.

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

2.1.2.1 Updated Final Safety Analysis Report

The Oyster Creek Updated Final Safety Analysis Report (UFSAR) was initially issued following the completion of the NRC Systematic Evaluation Program (SEP), and has since been updated regularly in accordance with the requirements of 10 CFR 50.71(e). The UFSAR provided significant input for system and structure descriptions and functions.

2.1.2.2 Fire Hazards Analysis Report

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

2.1.2.3 Environmental Qualification Master List

The scope of the electrical equipment and components that must be environmentally qualified for use in a harsh environment at Oyster Creek is identified in the Environmental Qualification (EQ) Master List. This document is a database listing of equipment and components, and includes fields that identify specific equipment information such as manufacturer, plant location and qualification level. The EQ Master List data has been migrated to the Oyster Creek Component Record List (CRL). The CRL includes an Environmental Qualification data field, and this field is used to identify the EQ components from the EQ Master List. The CRL EQ data field is a design quality field, which means the data is controlled and has been verified accurate.

2.1.2.4 Maintenance Rule Database

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

2.1.2.5 Facility Description and Safety Analysis Report (FDSAR)

This report was submitted to the Atomic Energy Commission in support of the application for an operating license to initially operate the Oyster Creek Generating Station. The FDSAR included the principal design criteria, with description and analysis of how the various plant systems and components were designed to satisfy the principal design criteria.

2.1.2.6 NUREG-0822 and NUREG-0822 Supplement 1

Issued in January 1983, NUREG-0822 is the final NRC Integrated Plant Safety Assessment Report (IPSAR) prepared under the scope of the SEP. The SEP was initiated by the NRC to review the design of older operating nuclear reactor plants to reconfirm and document their safety. Some follow-up requirements for additional analysis were identified in the final IPSAR. Upon completion, these additional items were reviewed and are addressed by NUREG-0822 Supplement 1.

2.1.2.7 NUREG-1382

Issued in January 1991, NUREG-1382 is the NRC Safety Evaluation Report (SER) related to the full-term operating license for Oyster Creek Generating Station. The major portion of the technical input was provided by the IPSAR and SEP topic evaluations, but the SER also addresses other operating license issues not covered under the SEP.

2.1.2.8 Design Basis Documents

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

2.1.2.9 Controlled Plant Component Database

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

2.1.2.10 Other CLB References

NRC Safety Evaluation Reports include NRC staff review of various Oyster Creek submittals, and may include licensee commitments.

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

Engineering drawings provide system, structure and component configuration details for Oyster Creek. These drawings were used in conjunction with the plant component database records to support scoping and screening evaluations.

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

2.1.3 TECHNICAL POSITION PAPERS

Technical position papers were prepared in support of the license renewal project. Engineers experienced in BWR systems, programs and operations prepared the position papers. Position papers contain technical evaluations and bases for decisions or positions associated with various license renewal requirements. Position papers are prepared, reviewed and approved in accordance with controlled project procedures, and are based on the CLB source documents described in Section 2.1.2.

The following sections describe the significant technical position papers associated with the Oyster Creek scoping and screening methodology.

2.1.3.1 License Renewal Systems and Structures List

One of the first steps necessary to begin the license renewal scoping process was to identify a comprehensive list of systems and structures to be evaluated for license renewal scoping. While there exists a variety of document sources that identify and list Oyster Creek systems and structures, no single source provided the comprehensive list in a format appropriate for 10 CFR 54.4 license renewal system and structure scoping. Therefore, a position paper was prepared to establish a comprehensive list of license renewal systems and structures, and to document the basis for the list. Starting with the systems and structures list contained in an approved engineering standard, the list was reviewed against the CRL, the Oyster Creek UFSAR, plant design drawings, the maintenance rule database, and other plant design documents. The position paper grouped license renewal systems and structures into the following categories:

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

When grouping the Oyster Creek license renewal systems and structures into these categories, the guidance of NUREG-1801 “Generic Aging Lessons Learned (GALL) Report” was utilized. The position paper also identifies the components that are evaluated as commodity groups. The complete list of systems, structures and commodity groups evaluated for license renewal is provided in Section 2.2 of this application.

Certain structures and equipment were excluded at the outset because they do not meet criteria 10 CFR 54.4(a)(1), (a)(2) or (a)(3). These include: driveways and parking lots, temporary equipment, health physics equipment, portable measuring and testing equipment, tools and motor vehicles.

2.1.3.2 Identification of Safety Related Systems and Structures

Safety related systems and structures are included in the scope of license renewal in accordance with 10 CFR 54.4(a)(1) scoping criterion. Oyster Creek systems and structures that have been classified as safety related are identified as “Q” in the controlled quality classification data field in the CRL. Oyster Creek quality classification procedures were reviewed against the license renewal “Safety Related” scoping criterion in 10 CFR 54.4(a)(1), to confirm that Oyster Creek safety related classifications are consistent with license renewal requirements. This review was documented in a technical position paper. The position paper provides a summary list of the systems and structures that are safety related at Oyster Creek. These systems and structures were included in the scope of license renewal under the 10 CFR 54.4(a)(1) scoping criteria.

The Oyster Creek quality classification procedure definition of safety related (Q) is as follows:

A structure, system or component shall be classified as Safety Related (Q) if designed to remain functional for all design basis conditions necessary to ensure:

- *Integrity of reactor coolant pressure boundary,*
- *Capability to shutdown reactor and maintain it in a safe (hot) shutdown condition, or*
- *Capability to prevent or mitigate consequences of accidents which could result in potential off-site exposures comparable to guideline exposures of 10 CFR 100*

This definition is nearly identical to 10 CFR 54.4(a)(1). The differences are addressed as follows:

Design Basis Events

The Oyster Creek procedure definition refers to “all design basis conditions” while 10 CFR 54.4(a)(1) is more specific, referring to design basis events as defined in 10 CFR 50.49(b)(1). For Oyster Creek license renewal, an additional technical position paper was prepared to confirm that all applicable design basis events were considered. The position paper documented a review of design basis internal and external events, including abnormal operational transients, anticipated operational occurrences, and natural phenomena as described in the current licensing basis, and provided a summary list of those additional systems and structures relied upon to remain functional to ensure 10 CFR 54.4(a)(1) functions during and following such events. These additional systems and structures were included in the scope of license renewal under 10 CFR 54.4(a)(1).

Exposure Guidelines

The Oyster Creek quality classification procedure “Safety Related” definition refers to 10 CFR 100 for accident exposure guidelines. The license renewal rule references the guidelines in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable. These different exposure guidelines appear in three different Code sections to address similar accident analyses performed by licensees for different reasons. The guidelines in 10 CFR 50.34(a)(1) are applicable to facilities seeking a construction permit, and are therefore not applicable to Oyster Creek license renewal. The guidelines in 10 CFR 50.67(b)(2) are applicable to facilities seeking to revise the current accident source term used in their design basis radiological analyses. Oyster Creek has submitted revisions to its LOCA accident source term in design basis radiological consequences analyses, but has not yet submitted a license amendment application under 10 CFR 50.67 for other accidents. The Main Condenser and portions of the Main Steam system are credited for radiological plate out and holdup for the Control Rod Drop Accident (CRDA), and are therefore included in the scope of license renewal to perform this intended function. In accordance with NUREG-0800 Standard Review Plan Section 15.4.9, it is not required that the condenser be safety related for this event.

If an additional license amendment request under 10 CFR 50.67 is submitted and approved by the NRC, then it will be reviewed to identify any additional systems, structures and components that would have been subject to an aging management review or evaluation of time-limited aging analysis, in accordance with the requirements of 10 CFR 54.37(b).

Hot Shutdown

The Oyster Creek definition refers to the hot shutdown condition. Systems required to achieve cold shutdown at Oyster Creek are also classified safety related and included in the scope of license renewal.

When supplemented with the broad review of CLB design basis events, the Oyster Creek quality classification procedure definition of “safety related" is consistent with 10 CFR 54.4(a)(1), and results in a comprehensive list of safety related systems and structures that were included in the scope of license renewal. This is consistent with NUREG-1800 Section 2.1.3.1.1.

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

All non-safety related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified under

10 CFR 54.4 (a)(1), were included in the scope of license renewal in accordance with 10 CFR 54.4(a)(2) requirements. To assure complete and consistent application of this scoping criterion, a technical position paper was prepared.

This license renewal scoping criteria requires consideration of the following:

1. Non-safety related SSCs required to perform a function that supports a safety related SSC.

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

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

4. Certain non-safety related mitigative plant design features that are part of the Oyster Creek CLB

The first item is addressed during the scoping process, by identifying the non-safety related systems and structures required to support the accomplishment of a safety related intended function under 10 CFR 54.4(a)(1), and then confirming that these supporting systems and structures are also included in scope.

The remaining three items concern non-safety related systems with potential physical or spatial interaction with safety related systems, structures and components. Scoping of these systems is the subject of NRC Interim Staff Guidance ISG-09, as discussed in Section 2.1.4.9. To assure complete and consistent application of 10 CFR 54.4(a)(2) requirements and the ISG, a technical position paper was prepared. The position paper documents a review of the CLB references relevant to physical or spatial interactions, including plant design features intended to assure failures will not prevent satisfactory accomplishment of required intended functions.

The position paper describes the Oyster Creek approach to scoping of non-safety related systems with a potential for physical or spatial interaction with safety related SSCs. Oyster Creek chose to implement the preventive option as described in the ISG, although certain mitigative plant features are also included in scope. The paper provides appropriate guidance to assure that license renewal scoping for 10 CFR 54.4(a)(2) met the requirements of the license renewal rule and the ISG. See Section 2.1.5.2 for additional discussion of the application of this scoping criterion.

2.1.3.4 <u>Systems and Structures Credited for Regulated Events</u>

Technical position papers were prepared to address license renewal scoping of SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection, environmental qualification, anticipated transients without scram and station blackout. The Commission's regulations for pressurized thermal shock are not applicable to the Oyster Creek boiling water reactor design. These position papers are summarized below:

Fire Protection

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

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

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

Recent NRC guidance, including NUREG-0800 Section 9.5.1 Appendix C (reference 1.7.13) and the ISG-7 scoping guidance for fire protection equipment, states that the scope of 10 CFR 50.48 goes beyond the protection of safety related equipment, and also includes fire protection systems, structures and components needed to minimize the effects of a fire and to prevent the release of radioactive material to the environment. Fire protection system and structure scoping for Oyster Creek is performed consistent with this guidance, and is documented in the technical position paper.

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

The fire detection and suppression systems at Oyster Creek are plant-wide systems that protect a wide variety of plant equipment. Not all portions of these systems are required to demonstrate compliance with 10 CFR 50.48. Some branches of the fire detection and suppression systems protect plant areas in which a fire would not impact any equipment important to safety, or significantly increase the risk of radioactive releases to the environment. Portions of the fire suppression and detection systems that are not included in the scope of license renewal are identified and documented in the technical position paper. System branches that have not been included in scope can be isolated from the remaining in scope system by closing the associated isolation valve. The isolation valve is included in scope.

<u>Environmental Qualification</u>

Criterion 10 CFR 54.4(a)(3) requires that all systems, structures and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for environmental qualification (10 CFR 50.49) be included in the scope of license renewal.

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

The environmental qualification position paper summarizes the results of a review of Oyster Creek EQ program documents. The EQ position paper provides a list of systems that include EQ components. The EQ position paper also provides a list of structures that are credited to provide the physical boundaries for the postulated harsh environments, and contain environmentally qualified electrical equipment. These systems and structures were included in the scope of license renewal under the 10 CFR 54.4(a)(3) scoping criteria.

Anticipated Transients Without Scram

Criterion 10 CFR 54.4(a)(3) requires that all systems, structures and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for anticipated transients without scram (10 CFR 50.62) be included in the scope of license renewal.

An anticipated transient without scram (ATWS) is a postulated operational transient that generates an automatic scram signal, accompanied by a failure of the reactor protection system to shutdown the reactor. The ATWS rule (10 CFR 50.62) requires improvements in the design and operation of boiling water reactors to reduce the likelihood of failure to shutdown the reactor following anticipated transients, and to mitigate the consequences of an ATWS event. The requirements for a BWR are to install an alternate rod insertion (ARI) system, a reactor coolant recirculation pump trip (RPT) system to be actuated for conditions indicative of an ATWS, and an adequately sized standby liquid control (SLC) system.

The ATWS position paper summarizes the results of a review of the Oyster Creek current licensing basis with respect to ATWS. Oyster Creek has ATWS mitigation instrumentation and logic necessary for ARI and RPT to mitigate the consequences of an ATWS event. Oyster Creek also has an adequately sized standby liquid control system. The ATWS position paper provides a list of the systems required by 10 CFR 50.62 to reduce the risk from ATWS events. The position paper also provides a list of structures that are credited to provide physical support and protection for the credited ATWS systems. These systems and structures were included in the scope of license renewal under the 10 CFR 54.4(a)(3) scoping criteria.

Station Blackout

Criterion 10 CFR 54.4(a)(3) requires that all systems, structures and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for station blackout (10 CFR 50.63) be included in the scope of license renewal.

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

Oyster Creek implemented plant modifications and procedures in response to 10 CFR 50.63 to enable the station to withstand and recover from a station blackout of a specified duration. Recovery includes the ability to achieve and maintain hot shutdown of the reactor. Oyster Creek capabilities, commitments and analyses that demonstrate compliance with 10 CFR 50.63 are documented in UFSAR Section 15.9 and in NRC safety evaluation reports and correspondence related to the SBO rule.

The NRC staff guidance ISG-02 on scoping of equipment relied on to meet the requirements of the SBO rule (10 CFR 50.63) for license renewal has been incorporated into the Oyster Creek scoping methodology. In accordance with the ISG requirements, the SSCs required to recover from the SBO event are included in the scope of license renewal. For Oyster Creek, this is the portion of the plant electrical system used to connect the safety related buses to offsite power and recover from an SBO event, in addition to the onsite emergency power system. This includes the disconnect switches on the supply side of the switchyard circuit breakers, connecting the 34.5 kV Oyster Creek substation to OCGS, and continues through the startup transformers to the switchgear breakers of the plant 4160V AC buses.

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

2.1.4 INTERIM STAFF GUIDANCE DISCUSSION

The NRC has encouraged applicants for license renewal to address proposed Interim Staff Guidance (ISG) issues in license renewal applications. The following is the complete list of ISG issues as of January 2005.

ISG-1 GALL Report Presenting One Acceptable Way to Manage Aging Effects for License Renewal

ISG-2 Station Blackout Scoping

ISG-3 Concrete Aging Management Program

ISG-4 Fire Protection System Piping Aging Management

ISG-5 Identification and Treatment of Electrical Fuse Holders

ISG-6 Identification and Treatment of Housing for Active Components

ISG-7 Scoping Guidance for Fire Protection Equipment

ISG-8 Updating the Improved License Renewal Guidance Documents – ISG Process

ISG-9 Identification and Treatment of Structures, Systems and Components Which Meet 10 CFR 54.4(a)(2)

ISG-10 Standardized Format for License Renewal Applications

ISG-11 Aging Management of Environmental Fatigue for Carbon/Low-Alloy Steel

ISG-12 Operating Experience with Cracking of Class 1 Small-Bore Piping

ISG-13 Management of Loss of Preload on Reactor Vessel Internals Bolting Using the Loose Parts Monitoring System

ISG-14 Operating Experience with Cracking in Bolting

ISG-15 Revision to GALL Aging Management Program XI.E2

ISG-16 Time-Limited Aging Analyses Supporting Information

ISG-17 Bus Ducts (Iso-phase and Non-segregated) for Electrical Bus Bar

ISG-18 Revision to GALL AMP XI.E3 for Inaccessible Cable (Medium Voltage)

ISG-19 Include Nickel-alloy Nozzles and Penetrations in AMP XI.M11

ISG-20 Include Steam Generator Tube Integrity in AMP XI.M19

ISG-21 Improve GALL Guidance on Reactor Vessel Internals

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

2.1.4.1 GALL Report Presenting One Acceptable Way to Manage Aging Effects for License Renewal (ISG-01)

Oyster Creek applied NUREG-1801 for aging management, or provided justification for any alternative methods.

2.1.4.2 Station Blackout Scoping (ISG-02)

NRC guidance on this issue is as follows: “Both the offsite and onsite power systems are relied upon to meet the requirements of the SBO rule. Elements of both offsite and onsite power are necessary to determine the required coping duration under 10 CFR 50.63(a)(1), and the procedures required by

10 CFR 50.63(c)(1)(ii) must address both offsite power and onsite power restoration. It follows, therefore, that both systems are used to demonstrate compliance with the SBO rule and must be included within the scope of license renewal consistent with the requirements of 10 CFR 54.4(a)(3)." Further clarification was provided which stated that, "the staff has determined that the plant system portion of the Offsite Power System that is used to connect the plant to the offsite power source should be included within the scope of the rule. This path typically includes the switchyard circuit breakers that connect to the Offsite Power System transformers (Startup transformers), the transformers themselves, the intervening overhead or underground circuits between circuit breaker and transformer and transformer and onsite electrical distribution system, and the associated control circuits and structures."

Scoping of Oyster Creek systems and structures relied on to demonstrate compliance with the Commission's regulations for station blackout is documented in a technical position paper as described in Section 2.1.3.4. As stated above, the regulatory guidance of ISG-02 mandates the inclusion of selected offsite power SSCs that may be used for restoration of offsite power following an SBO event, beyond those specifically identified in the regulatory commitments made to satisfy 10 CFR 50.63 criteria. Therefore, the SSCs that provide for restoration of offsite power following an SBO event are also included within the scope of License Renewal, in accordance with this guidance.

2.1.4.3 Concrete Aging Management Program (ISG-03)

Concrete subject to aging management review has been included in an aging management program in accordance with the ISG. This includes concrete for which no aging effects requiring management were identified. See Section 3.5.

2.1.4.4 Fire Protection System Piping Aging Management (ISG-04)

In a letter dated December 3, 2002, from the NRC to NEI, "Interim Staff Guidance (ISG)-04: Aging Management Of Fire Protection Systems For License Renewal," (reference 1.7.14) the NRC provided clarification of previous aging management guidance outlined in the program description in NUREG-1801 Chapter XI.M26, Fire Protection, and Chapter XI.M27, Fire Water Systems. The new guidance provides clarifications regarding wall thickness evaluation methods for fire protection system piping, as well as clarification of sprinkler heads testing requirements in accordance with NFPA standards. The ISG also eliminates the previously recommended functional testing of halon and carbon dioxide fire suppression systems. The Oyster Creek aging management programs for fire protection systems is consistent with the ISG-04 guidance. The Oyster Creek aging management programs include guidance as to the performance of volumetric inspections, wall thickness evaluations, and sprinkler head testing.

2.1.4.5 Identification and Treatment of Electrical Fuse Holders (ISG-05)

Consistent with the requirements specified in 10 CFR 54.4(a), fuse holders (including fuse clips and fuse blocks) are considered to be passive electrical components. Fuse holders are scoped, screened, and included in the aging management review in the same manner as terminal blocks and other types of electrical connections. However, fuse holders inside the enclosure of an active component, such as control boards, control panels, switchgear, power supplies, power inverters, battery chargers, circuit boards, and other electrical equipment, are considered to be piece parts of the larger assembly, and are therefore not subject to aging management review.

Fuse holders perform a primary function similar to other types of electrical connections by providing an electrical circuit to deliver rated voltage, current, or signals. These intended functions meet the criteria of 10 CFR 54.4(a). Additionally, these intended functions are performed without moving parts or without a change in configuration or properties as described in 10 CFR 54.21 (a)(1)(i). Fuse holders are therefore passive, long-lived electrical components within the scope of license renewal and subject to an AMR. Therefore, aging management of fuse holders would be required for those cases where fuse holders are not considered subcomponent parts of a larger assembly. Oyster Creek is consistent with this ISG guidance. The aging management review performed for Oyster Creek fuse holders identified no aging effects that require management.

2.1.4.6 Identification and Treatment of Housing for Active Components (ISG-06)

Oyster Creek has treated the housings for active components such as pump casings, valve bodies, damper and fan housings, heating and cooling coils as passive and therefore subject to aging management review, consistent with this ISG guidance.

2.1.4.7 Scoping Guidance for Fire Protection Equipment (ISG-07)

Scoping of Oyster Creek systems and structures relied on to demonstrate compliance with the Commission's regulations for fire protection is documented in a technical position paper as described in Section 2.1.3.4. Scoping under this criterion goes beyond the systems and structures required for the protection of safety related equipment, and includes systems and structures relied on to minimize the effects of a fire and prevent the release of significant radioactive material if a fire does occur. The Oyster Creek scoping methodology is consistent with this NRC guidance.

2.1.4.8 Updating the Improved License Renewal Guidance Documents – ISG Process (ISG-08)

This issue does not provide any guidance for applicants, and no response is required.

2.1.4.9 Identification and Treatment of Structures, Systems and Components Which Meet 10 CFR 54.4(a)(2) (ISG-09)

The NRC staff issued this ISG to clarify the scoping requirements for 10 CFR 54.4(a)(2). The guidance requires that, when demonstrating that failures of non-safety related systems would not adversely impact on the ability to maintain intended functions, a distinction must be made between non-safety related systems that are connected to safety related systems and those that are not connected to safety related systems. For a non-safety related system that is connected to a safety related system, the non-safety related system should be included within the scope of license renewal up to and including the first seismic anchor past the safety/non-safety interface, and appropriate aging management programs applied.

For non-safety related systems which are not connected to safety related piping or components, or are beyond the first seismic anchor past the safety/non-safety interface, but have a spatial relationship such that their failure could adversely impact on the performance of a safety-related SSC's intended function, the applicant has two options when performing its scoping evaluation; a mitigative option or a preventive option. When mitigative features (e.g., pipe whip restraints, jet impingement shields, spray and drip shields, seismic supports, flood barriers) are provided to protect safety related SSCs from failures of non-safety related SSCs, this demonstration should show that mitigating devices are adequate to protect safety related SSCs from failures of non-safety related SSCs regardless of failure location. If this level of protection can be demonstrated, then only the mitigative features need to be included within the scope of license renewal. However, if an applicant cannot demonstrate that the mitigative features are adequate to protect safety related SSCs from the consequences of failures of non-safety related SSCs, then the applicant should utilize the preventive option, which requires that the entire non-safety related SSC be brought into the scope of license renewal.

The methodology for identification of Oyster Creek SSCs that satisfy the 10 CFR 54.4(a)(2) scoping criterion was based on a review of applicable CLB documents, plant specific and industry operating experience. The preventive option is utilized to demonstrate that safety related SSCs are adequately protected from failure of non-safety related SSCs. A limited number of non-safety related mitigative features, such as missile barriers, flood barriers, and spray shields, are credited in the Oyster Creek CLB for the protection of safety related SSCs. These mitigative features were also included in the scope of license renewal and were evaluated as structural components.

The Oyster Creek scoping methodology for 10 CFR 54.4(a)(2) is consistent with this NRC guidance. See Section 2.1.5.2 for additional discussion of the application of these scoping criteria.

2.1.4.10 Standardized Format for License Renewal Applications (ISG-10)

The NEI standard license renewal format was utilized during the preparation of this application.

2.1.4.11 Aging Management of Environmental Fatigue for Carbon/Low-Alloy Steel (ISG-11)

Aging management of environmental fatigue for carbon/low-alloy steel items is discussed in Section 4.3.

2.1.4.12 Operating Experience with Cracking of Class 1 Small-Bore Piping (ISG-12)

Management of cracking associated with ASME Class 1 small-bore piping has been incorporated into the One-Time Inspection Program described in Section B.1.24. The aging management program is consistent with ISG-12.

2.1.4.13 Management of Loss of Preload on Reactor Vessel Internals Bolting Using the Loose Parts Monitoring System (ISG-13)

The NRC has not developed a position on this issue. Oyster Creek does not have a Loose Parts Monitoring System. Aging management of reactor vessel internals is addressed in Section B.1.9, BWR Vessel Internals.

2.1.4.14 Operating Experience with Cracking in Bolting (ISG-14)

The NRC has not developed a position on this issue. Aging management of bolting is addressed in Section B.1.12, Bolting Integrity.

2.1.4.15 Revision to GALL Aging Management Program XI.E2 (ISG-15)

Oyster Creek has applied this ISG in the development of the LRA. This aging management program is described in Section B.1.35, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used In Instrument Circuits.

2.1.4.16 Time-Limited Aging Analyses Supporting Information (ISG-16)

Oyster Creek has applied this ISG in the development of the LRA. Time-Limited Aging Analyses are discussed in Section 4.0.

2.1.4.17 Bus Ducts (Iso-phase and Non-segregated) for Electrical Bus Bar (ISG-17)

There are no bus ducts within the scope of license renewal at Oyster Creek.

2.1.4.18 Revision to GALL AMP XI.E3 for Inaccessible Cable (Medium Voltage) (ISG-18)

Oyster Creek has applied this ISG in the development of the LRA. Aging management for inaccessible medium voltage cable is addressed in Section B.1.36, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

2.1.4.19 Include Nickel-alloy Nozzles and Penetrations in AMP XI.M11 (ISG-19)

This aging management program is only applicable to pressurized water reactors, and is therefore not applicable to the Oyster Creek boiling water reactor design.

2.1.4.20 Include Steam Generator Tube Integrity in AMP XI.M19 (ISG-20)

Oyster Creek is a boiling water reactor design and does not utilize steam generators. Therefore, this issue is not applicable to Oyster Creek.

2.1.4.21 Improve GALL Guidance on Reactor Vessel Internals (ISG-21)

The NRC has not developed a position on this issue. Aging management of reactor vessel internals is addressed in Section B.1.9, BWR Vessel Internals.

2.1.5 SCOPING PROCEDURE

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

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

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

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

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

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

2.1.5.1 Safety Related – 10 CFR 54.4(a)(1)

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

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

At Oyster Creek, the safety related systems and structures are identified in the Component Record List (CRL). The safety-related classifications in the Oyster Creek CRL were established using a controlled procedure, with classification criteria nearly identical to the above 10 CFR 54.4(a)(1) criteria. The classification criteria differences were evaluated in a license renewal position paper (see Section 2.1.3.2) and accounted for during the license renewal scoping process.

Safety related classifications for systems and structures were based on system and structure descriptions and analyses in the UFSAR, or on design basis documents such as engineering drawings, evaluations or calculations. Systems and structures that are identified as safety-related in the UFSAR, in design basis documents or in the CRL have been classified as satisfying criteria of 10 CFR 54.4(a)(1) and have been included within the scope of license renewal. The review also confirmed that all plant conditions, including conditions of normal operation, abnormal operational transients, design basis accidents, internal and external events, and natural phenomena for which the plant must be designed, were considered for license renewal scoping under 10 CFR 54.4(a)(1) criteria.

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

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

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

This scoping criteria requires an assessment of non-safety related SSCs with respect to the following application or configuration categories:

- Functional support for safety related SSC 10 CFR 54.4(a)(1) functions
- Connected to and provide structural support for safety related SSCs
- Potential for spatial interactions with safety related SSCs
- Mitigative plant design features that are part of the Oyster Creek CLB

Each of these are categories are discussed below:

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

This category addresses non-safety related SSCs that are required to function in support of a safety related SSC intended function. The functional requirement distinguishes this category from the next two categories, where the non-safety related SSCs are required only to maintain adequate integrity to preclude structural failure or spatial interactions. The non-safety related SSCs that were included in scope under this review, to support a safety related SSC in performing its 10 CFR 54.4(a)(1) intended function, are identified on the License Renewal Boundary Drawings in green.

The Oyster Creek UFSAR and other CLB documents were reviewed to identify non-safety related systems or structures credited with supporting satisfactory accomplishment of a safety related function. Non-safety related systems or structures credited in CLB documents to support a safety-related function have been included within the scope of license renewal.

A supporting system review was completed as part of the scoping process. The scoping process was performed on a system and structure basis. The scoping evaluation for each system and structure was documented on a System and Structure Scoping Form. When a system was included in scope under 10 CFR 54.4(a)(1), the scoping evaluation included the identification of any additional systems or structures required to support the safety related system intended functions. It was then confirmed that these identified supporting systems and structures were also included in scope. Identification of supporting systems was not required for structures, as structural intended functions do not rely on supporting systems.

This review did not identify many non-safety related systems or structures that were required to support the accomplishment of safety related functions. Systems and structures required to support safety related functions are generally classified safety related at Oyster Creek, and as such included in the scope of license renewal under 10 CFR 54.4(a)(1). The systems and structures identified by this review were included in the scope of license renewal under 10 CFR 54.4(a)(2).

The next three 10 CFR 54.4(a)(2) scoping categories are the subject of NRC Interim Staff Guidance ISG-9. The NRC staff issued this ISG to clarify the scoping requirements for 10 CFR 54.4(a)(2). The guidance requires that, when demonstrating that failures of non-safety related systems would not adversely impact on the ability to maintain intended functions, a distinction must be made between non-safety related systems that are connected to safety related systems and those that are not connected to safety related systems. For a non-safety related system that is connected to a safety related system, the non-safety related system should be included within the scope of license renewal up to and including the first seismic anchor past the safety/non-safety interface, and appropriate aging management programs applied.

For non-safety related systems which are not connected to safety related piping or components, or are beyond the first seismic anchor past the safety/non-safety interface, but have a spatial relationship such that their failure could adversely impact on the performance of a safety-related SSC's intended function, the applicant has two options when performing its scoping evaluation; a mitigative option or a preventive option. When mitigative features (e.g., pipe whip restraints, jet impingement shields, spray and drip shields, seismic supports, flood barriers) are provided to protect safety related SSCs from failures of non-safety related SSCs, this demonstration should show that mitigating devices are adequate to protect safety related SSCs from failures of non-safety related SSCs regardless of failure location. If this level of protection can be demonstrated, then only the mitigative features need to be included within the scope of license renewal. However, if an applicant cannot demonstrate that the mitigative features are adequate to protect safety related SSCs from the consequences of failures of non-safety related SSCs, then the applicant should utilize the preventive option, which requires that the entire non-safety related SSC be brought into the scope of license renewal.

The methodology for identification of Oyster Creek SSCs that satisfy the 10 CFR 54.4(a)(2) scoping criterion was based on a review of applicable CLB documents, plant specific and industry operating experience. The preventive option is utilized to demonstrate that safety related SSCs are adequately protected from failure of non-safety related SSCs. A limited number of non-safety related mitigative features, such as missile barriers, flood barriers, and spray shields, are credited in the Oyster Creek CLB for the protection of safety related SSCs. These mitigative features were also included in the scope of license renewal and were evaluated as structural components.

Connected to and Provide Structural Support for Safety Related SSCs

For a non-safety related piping system connected to a safety related piping system, the non-safety related system was conservatively assumed to provide structural support to the safety related system, unless otherwise confirmed by a review of the installation details. The entire non-safety related system was included in scope for 10 CFR 54.4(a)(2), up to one of the following:

1. An anchor or three mutually perpendicular restraints (the supports were included in scope) that are equivalent to a seismic anchor in the Oyster Creek CLB

2. An anchored component such as a pump, heat exchanger, or turbine (the component was included in scope)

3. A wall or slab penetration that provide anchorage (the wall or slab was included in scope)

4. A point where the non-safety related line exits a structure and is routed underground

5. A flexible hose or flexible joint that is not capable of load transfer

6. The end of the piping run (e.g., vent and drain lines).

These scoping boundaries are determined from the physical installation details, confirmed in most cases by review of design drawings or visual inspection by plant walkdown.

Failure in the non-safety related piping beyond the above anchor or equivalent anchor locations would not impact structural support for the safety related piping. The associated SSCs included in the scope of license renewal are identified on the License Renewal Boundary Drawings in red. Note that if the connected non-safety related piping system contains water, steam or oil, then the in-scope boundary may extend beyond the locations described above due to potential spatial interaction.

Potential for Spatial Interactions with Safety Related SSCs

Non-safety related systems that are not connected to safety related piping or components, or are beyond the first equivalent seismic anchor past the safety/non-safety interface, and have a spatial relationship such that their failure could adversely impact on the performance of a safety-related SSC intended function, must be evaluated for license renewal scope in accordance with 10 CFR 54.4(a)(2) requirements. As described in ISG-9, there are two options when performing this scoping evaluation: a mitigative option and a preventive option.

The mitigative option involves crediting plant mitigative features (e.g., pipe whip restraints, jet impingement shields, spray and drip shields, seismic supports, flood barriers) to protect safety related SSCs from failures of non-safety related SSCs. This option requires a demonstration that the mitigating features are adequate to protect safety related SSCs from failures of non-safety related SSCs regardless of failure location. If this level of protection can be demonstrated, then only the mitigative features need be included within the scope of the scope of license renewal.

The preventive option involves identifying the non-safety related SSCs that have a spatial relationship such that their failure could adversely impact on the performance of a safety-related SSC intended function, and including the identified non-safety related SSC in the scope of license renewal without consideration of plant mitigative features.

Oyster Creek applied the preventive option for 10 CFR 54.4(a)(2) scoping. Certain plant mitigative features that are part of the Oyster Creek CLB are also included in the scope of license renewal, as described below.

The preventive option as implemented at Oyster Creek is based on a "spaces" approach for scoping of non-safety related systems with potential spatial interaction with safety related SSCs. Potential spatial interaction is assumed in any structure that contains active or passive safety related SSCs. The structures of concern for potential spatial interaction were identified based on a review of the CLB to determine which structures contained active or passive safety related SSCs. Plant walkdowns were performed as required to confirm that all structures containing safety related SSCs had been identified.

For structures that contain safety related SSCs, there may be selected rooms within the structure that do not contain any safety related SSCs. CLB document reviews and plant walkdowns were utilized as appropriate to confirm that these rooms did not contain safety related SSCs, thereby eliminating spatial interaction concerns within these rooms.

Non-safety related systems and components that contain water, oil, or steam, and are located inside structures that contain safety related SSCs, are included in scope for potential spatial interaction under criterion 10 CFR 54.4(a)(2), unless located in an excluded room. All high-energy lines located inside or outside primary containment are included in the scope of license renewal, under 10 CFR 54.4 (a)(1) or (a)(2), depending on their safety classification. Safety related high-energy lines are in scope under 10 CFR 54.4 (a)(1), and non-safety related high-energy lines are in scope under 10 CFR 54.4 (a)(2). System piping and components containing steam below atmospheric pressure, i.e., under vacuum conditions, do not pose a potential spray hazard and are therefore not included in the scope of license renewal for potential spatial interaction with safety related equipment. Supports for all non-safety related SSCs within these structures are included in scope.

Air and gas systems (non-liquid) are not a hazard to other plant equipment, and have therefore been determined not to have spatial interactions with safety-related SSCs. Oyster Creek and industry operating experience has not identified failures due to aging that have adversely impacted the accomplishment of a safety function. SSCs containing air or gas cannot adversely affect safety related SSCs due to leakage or spray, since gas systems contain no fluids that could spray or leak onto safety-related systems causing shorts or other malfunctions. Gas systems do not contain sufficient energy to cause pipe whip or jet impingement. Thus the non-safety related systems containing air or gas (except portions attached to safety related SSCs and required for structural support) are not included in the scope of license renewal for 10 CFR 54.4(a)(2). The supports are included in scope to prevent the non-safety related piping from falling down and potentially impacting safety related SSCs.

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

Mitigative Plant Design Features that are Part of the Oyster Creek CLB

Missile Barriers - SSCs that provide missile barrier protection are generally classified as safety related structures in the CLB and are therefore in the scope of license renewal under 10 CFR 54.4(a)(1) requirements. However, some non-safety related walls in the turbine building are credited for missile protection and are in scope of license renewal under 10 CFR 54.4(a)(2) requirements.

Flood Barriers – Non-safety related flood protection features, such as walls, dikes, curbs, and seals, are included in the scope of license renewal under 10 CFR 54.4(a)(2) requirements. These features are evaluated as a commodity with the structures in which they are located.

Spray Shields - Spray shields are included in the scope of license renewal under 10 CFR 54.4(a)(2) requirements. Spray shields are provided in the CLB to protect safety related components from inadvertent operation or failure of fire protection water systems. Spray shields are included as a commodity with the structures in which they are located.

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

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

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

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

2.1.5.4 System and Structure Intended Functions

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

2.1.5.5 Scoping Boundary Determination

Systems and structures that are included in the scope of license renewal are then further evaluated to determine the population of in-scope structures and components. This part of the scoping process is also a transition from the scoping process to the screening process. The process for evaluating mechanical systems is different from the process for structures, primarily because the plant design document formats are different. Mechanical systems are depicted primarily on system flow diagrams that show the system components and their functional relationships, while structures are depicted on physical drawings. Components of electrical systems are screened as commodities. Scoping boundaries for mechanical systems, electrical systems and structures are therefore described separately:

Mechanical Systems

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

Electrical and I&C Systems

Electrical and I&C systems, and electrical components within mechanical systems, did not require further system evaluations to determine which components were required to perform or support the identified intended functions. Electrical components within in-scope systems were included in the scope of license renewal. From the population of in scope electrical components, those that required an aging management review were evaluated as commodities during the screening process as described in Section 2.1.6.

The Station Blackout System is primarily an electrical system at Oyster Creek, and is included in LRA Sections 2.5.1.19 and 3.6 with other electrical systems and electrical commodities. However, since the Station Blackout System at Oyster Creek also includes the Forked River Combustion Turbines power plant, this system is evaluated similar to a mechanical system and includes a component table in Section 2.5 and Section 3.6, with reference to the aging management program credited for monitoring of the combustion turbines.

A single electrical boundary drawing was prepared to schematically show the portions of the plant electrical distribution system that are included in the scope of license renewal. The electrical boundary drawing shows the main in-plant distribution busses, and also shows the interfaces with the on-site emergency power supplies, the off-site power supplies and the alternate AC Station Blackout power source.

Structures

For structures, the structural components that support the intended functions are included in the scope of license renewal. The structural components are identified from a review of applicable plant design drawings of the structure. Plant walkdowns were performed when required for additional confirmation. A single site plan layout drawing is marked up to create a license renewal boundary drawing showing the in scope structures.

2.1.6 SCREENING PROCEDURE

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

2.1.6.1 Identification of Structures and Components Subject to AMR

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

Each application must contain the following information:

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

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

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

Structures and components that perform an intended function without moving parts or without a change in configuration or properties are defined as passive for license renewal. Passive structures and components that are not subject to replacement based on a qualified life or specified time period are defined as long-lived for license renewal. The screening procedure is the process used to identify the passive, long-lived structures and components in the scope of license renewal and subject to aging management review.

NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants” (Reference 1.7.4) and NEI 95-10, Appendix B (Reference 1.7.2), were used as the basis for the identification of passive structures and components. Most passive structures and components are long-lived. In the few cases where a passive component is determined not to be long-lived, such determination is documented in the screening evaluation and, if applicable, on the associated license renewal boundary drawing.

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

Mechanical Systems

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

Mechanical components are screened with the system in which they were scoped. The only exception involves heat exchangers and coolers, which often involve different system fluids on either side of the heat transfer surface. Heat exchangers and coolers are screened as follows:

1. With the exception of heat exchangers and coolers that are in scope only for 10 CFR 54.4 (a)(2) spatial interactions, the materials, environments and aging effects on both sides of the heat transfer surfaces are evaluated with the system that performs the cooling function. This convention was chosen

because the significant aging effects and associated aging management program activities are generally associated with the cooling system side.

2. For heat exchangers and coolers that are in scope for 10 CFR 54.4 (a)(2) only, the portions of the heat exchanger or cooler with the potential for spatial interaction are a function of the design and the process fluid. Therefore, each side of the heat exchanger or cooler is evaluated separately with the system associated with the process environment.

Structures

The structure screening process also began with the results from the scoping process. For in scope structures, the completed scoping packages include written descriptions of the structure. If only selected portions of the structure are in scope, the in-scope portions are described in the scoping evaluation. The associated structure drawings were carefully reviewed to identify the passive, long-lived structures and components, and the identified structures and components were then entered into the license renewal database. Component listings from the CRL were also reviewed to confirm that all structural components were considered. Plant walkdowns were performed when required for confirmation. Finally, the identified list of passive, long-lived structures and components was benchmarked against previous license renewal applications.

Electrical Systems and Components

Screening of electrical system components used a bounding approach as described in NEI 95-10. Electrical commodity groups used plant-wide were identified without regard to system. The commodity groups subject to an aging management review are identified by applying the criteria of 10 CFR 54.21(a)(1). This method provides the most efficient means for determining the electrical commodity groups subject to an aging management review since most of these components are active.

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

1. All electrical component types in use at Oyster Creek were identified and listed. The listing provided by NEI 95-10 Appendix B is the basis for this list. Electrical component types were organized into commodity groups such as breakers, switches, and cables. Individual components were not identified. The electrical component commodity groups were identified from a review of plant documents, controlled drawings, the plant equipment database (CRL), and interface with the parallel mechanical and civil/structural screening efforts.

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

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

4. Electrical commodity groups that perform no license renewal intended functions were not considered further because they do not require aging management review.

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

The electrical components that require an aging management review are the separate electrical components that are not a part of a larger active component. For example, the wiring, terminal blocks, and connections located internal to a breaker cubicle were considered to be parts of the breaker. Accordingly, the breaker is screened, but not the individual internal parts.

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

2.1.6.2 Passive Intended Function Definitions

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

The Containment, Holdup and Plateout intended function applies specifically to the Main Condenser, which does not have a Pressure Boundary intended function. Portions of the Main Steam system are also credited with the Containment, Holdup and Plateout intended function, however this function is bounded by the Pressure Boundary and Leakage Boundary intended functions for the Main Steam components.

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

Table 2.1-1 Passive Intended Function Definitions

Passive Intended Function	Definition
Absorb Neutrons	Provide neutron absorption in spent fuel pool to prevent criticality
Containment, Holdup and Plateout	Provide post accident containment, plateout of iodine and hold-up (for radioactive decay) of iodine and non-condensable gases before release.
Direct Flow	Provide spray shield or curbs for directing flow
Electrical Continuity	Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current, or signals
Enclosure Protection	Provide enclosure, shelter, or protection for in-scope equipment (including shielding)
Filter	Provide filtration
Fire Barrier	Provide rated fire barrier to confine or retard fire from spreading to or from adjacent areas of the plant
Flood Barrier	Provide flood protection barrier (internal and external flood event)
Gaseous Release Path	Provide path for release of filtered and unfiltered gaseous discharge
Heat Transfer	Provide heat transfer
HELB Shielding	Provide HELB shielding
Insulation - Electrical	Insulate and support an electric conductor
Insulation Jacket Integrity	Prevent moisture absorption and provide physical support of thermal insulation

Table 2.1-1 Passive Intended Function Definitions

Passive Intended Function	Definition
Leakage Boundary	Non-safety related component that maintains mechanical and structural integrity to prevent spatial interactions that could cause failure of safety related SSCs. This function includes the required structural support when the non-safety related leakage boundary piping is also attached to safety related piping.
Mechanical Closure	Mechanical closure (e.g., bolting)
Missile Barrier	Provide missile barrier (internal or external missiles)
Pipe Whip Restraint	Provide pipe whip restraint
Pressure Boundary	Provide pressure-retaining boundary so that sufficient flow at adequate pressure is delivered, or provide fission product barrier for containment pressure boundary, or provide containment isolation for fission product retention, or provide the containment, holdup and plateout function (for Main Steam system)
Pressure Relief	Provide a vent path for HELB pressure
Shielding	Provide shielding against radiation
Spray	Convert fluid into spray
Structural Support	Provide structural support for structures and components within the scope for 10 CFR 54.4(a)(1), (a)(2), or (a)(3), or provide structural integrity to preclude non-safety related component interactions that could prevent satisfactory accomplishment of a safety related function.
Thermal Insulation	Control of heat loss to preclude overheating of nearby safety related SSCs, 10 CFR 54.4 (a)(2)
Throttle	Provide flow restriction
Vibration Isolation	Provide flexible support for HVAC fan units.

Table 2.1-1 Passive Intended Function Definitions

Passive Intended Function	Definition
Water retaining boundary	Provide an essentially water leak tight boundary.

2.1.6.3 Stored Equipment

Equipment that is stored on site for installation in response to a design basis event is considered to be within the scope of license renewal. At Oyster Creek, certain Appendix R fire scenarios utilize stored equipment to facilitate repairs following the fire. The stored equipment credited for Appendix R repairs include cables and connectors, hoses, tubing, fittings, screws, nuts, washers, exhaust fans, and flexible duct. These components are confirmed available and in good operating condition by periodic surveillance inspections. Tools and supplies used to place the stored equipment in service are not in the scope of license renewal.

2.1.6.4 Consumables

The evaluation process for consumables is consistent with the guidance provided in NUREG-1800 Table 2.1-3. Consumables have been divided into the following four categories for the purpose of license renewal: (a) packing, gaskets, component seals, and O-rings; (b) structural sealants; (c) oil, grease, and component filters; and (d) system filters, fire extinguishers, fire hoses, and air packs.

- Group (a) subcomponents (packing, gaskets, seals, and O-rings): Based on ANSI B31.1 and the ASME B&PV Code Section III, the subcomponents of pressure retaining components as shown above are not pressure-retaining parts. Therefore, these subcomponents are not relied on to form a pressure-retaining function and are not subject to an AMR.
- Group (b) structural sealants: AMRs were required for structural sealants in in-scope structures. A summary of the AMR results is presented in Section 2.4.
- Group (c) subcomponents (oil, grease, and component filters): These components are short lived and are periodically replaced. Various plant procedures are used in the replacement of oil, grease, and filters in components that are in-scope for license renewal.
- Group (d) consumables (system filters, fire extinguishers, fire hoses, and air packs): System Ventilation filters are replaced in accordance with plant procedures based on vendor manufacturers' requirements and system testing. Fire extinguishers, self-contained breathing air packs and fire hoses are within the scope of license renewal, but are not subject to aging management because they are replaced based on condition. These components are periodically inspected in accordance with National Fire Protection Association (NFPA) standards. These standards require

replacement of equipment based on their condition or performance during testing and inspection. The periodic inspections are implemented by controlled Oyster Creek procedures. These components are subject to replacement based on NFPA standards implemented by controlled procedures, and are therefore not long-lived and not subject to an aging management review.

2.1.7 GENERIC SAFETY ISSUES

In accordance with the guidance in NEI 95-10 and Appendix A.3 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, review of NRC generic safety issues (GSIs) as part of the license renewal process is required to satisfy 10 CFR 54.29. This guidance suggests that GSIs involving issues related to license renewal aging management reviews or TLAAs should be addressed in the License Renewal Application. Based on Nuclear Energy Institute (NEI) and NRC guidance, NUREG-0933 and previous license renewal applicants, the following GSIs are addressed for Oyster Creek license renewal:

- GSI 168, Environmental Qualification of Electrical Equipment – This GSI has been closed by the NRC, as stated in Letter ACRSR-2028 from John T. Larkins, Executive Director of the Advisory Committee on Reactor Safeguards to William D. Travers, Executive Director for Operations, USNRC. EQ is addressed as a TLAA in Section 4.4.
- 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. In the closure letter, however, the NRC concluded that licensees should address the effects of reactor coolant environment on component fatigue life as aging management programs are formulated in support of license renewal. Accordingly, the issue of environmental effects on component fatigue life is addressed in Section 4.3.

NUREG-0933 (reference 1.7.15) was reviewed and there are no new generic issues that involve issues related to license renewal aging management reviews or TLAAs.

2.1.8 CONCLUSION

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

2.2 PLANT LEVEL SCOPING RESULTS

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

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Reactor Vessel, Internals, and Reactor Coolant System		
Control Rods (2.3.1.1)	Yes	
Fuel Assemblies (2.3.1.2)	Yes	
Isolation Condenser System (2.3.1.3)	Yes	
Nuclear Boiler Instrumentation (2.3.1.4)	Yes	
Reactor Head Cooling System (2.3.1.5)	Yes	
Reactor Internals (2.3.1.6)	Yes	
Reactor Pressure Vessel (2.3.1.7)	Yes	
Reactor Recirculation System (2.3.1.8)	Yes	
Engineered Safety Features Systems		
Automatic Depressurization System (2.3.2.1)	Yes	
Containment Spray System (2.3.2.2)	Yes	
Core Spray System (2.3.2.3)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Standby Gas Treatment System (SGTS) (2.3.2.4)	Yes	
Auxiliary Systems		
"C" Battery Room Heating & Ventilation (2.3.3.1)	Yes	
4160V Switchgear Room Ventilation (2.3.3.2)	Yes	
480V Switchgear Room Ventilation (2.3.3.3)	Yes	
Augmented Off-Gas Closed Cooling Water System	No	
Augmented Off-Gas System	No	
Battery and MG Set Room Ventilation (2.3.3.4)	Yes	
Breathing Air System	No	
Chemical Laboratory Auxiliary Gases	No	
Chlorination System (2.3.3.5)	Yes	
Circulating Water System (2.3.3.6)	Yes	
Containment Inerting System (2.3.3.7)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Containment Vacuum Breakers (2.3.3.8)	Yes	
Control Rod Drive System (2.3.3.9)	Yes	
Control Room HVAC (2.3.3.10)	Yes	
Cranes and Hoists (2.3.3.11)	Yes	
Dilution System	No	
Drywell Cooling System	No	
Drywell Floor and Equipment Drains (2.3.3.12)	Yes	
Elevators & Manlifts	No	
Emergency Diesel Generator and Auxiliary System (2.3.3.13)	Yes	
Emergency Service Water System (2.3.3.14)	Yes	
Fire Protection System (2.3.3.15)	Yes	
Fuel Storage and Handling Equipment (2.3.3.16)	Yes	
Hardened Vent System (2.3.3.17)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Heating & Process Steam System (2.3.3.18)	Yes	
Hydrogen & Oxygen Monitoring System (2.3.3.19)	Yes	
Hydrogen Water Chemistry System	No	
Instrument (Control) Air System (2.3.3.20)	Yes	
Main Fuel Oil Storage & Transfer System (2.3.3.21)	Yes	
Main Office Building HVAC	No	
Meteorological Monitoring System	No	
Miscellaneous Floor and Equipment Drain System (2.3.3.22)	Yes	
Miscellaneous HVAC System	No	
New Radwaste Closed Cooling Water System	No	
New Radwaste Service Water System	No	
Nitrogen Supply System (2.3.3.23)	Yes	
Noble Metals Monitoring System (2.3.3.24)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Penetration Pressurization System	No	
Plant Communications System	No	
Post-Accident Sampling System (2.3.3.25)	Yes	
Process Sampling System (2.3.3.26)	Yes	
Radiation Monitoring System (2.3.3.27)	Yes	
Radwaste Area Heating and Ventilation System (2.3.3.28)	Yes	
Radwaste System	No	
Reactor Building Closed Cooling Water System (2.3.3.29)	Yes	
Reactor Building Floor and Equipment Drains (2.3.3.30)	Yes	
Reactor Building Ventilation System (2.3.3.31)	Yes	
Reactor Water Cleanup System (2.3.3.32)	Yes	
Roof Drains and Overboard Discharge (2.3.3.33)	Yes	
Sanitary Waste System (2.3.3.34)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Screen Wash System	No	
Service Air System	No	
Service Water System (2.3.3.35)	Yes	
Shutdown Cooling System (2.3.3.36)	Yes	
Spent Fuel Pool Cooling System (2.3.3.37)	Yes	
Standby Liquid Control System (Liquid Poison System) (2.3.3.38)	Yes	
Torus Water Storage and Transfer System	No	
Traveling In-Core Probe System (2.3.3.39)	Yes	
Turbine Building Closed Cooling Water System (2.3.3.40)	Yes	
Turbine Building Ventilation System	No	
Water Treatment & Distr. System (2.3.3.41)	Yes	
Steam and Power Conversion Systems		
Condensate System (2.3.4.1)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Condensate Transfer System (2.3.4.2)	Yes	
Feedwater System (2.3.4.3)	Yes	
Main Condenser (2.3.4.4)	Yes	
Main Condenser Air Extraction System	No	
Main Generator and Auxiliary System (2.3.4.5)	Yes	
Main Steam System (2.3.4.6)	Yes	
Main Turbine and Auxiliary System (2.3.4.7)	Yes	
Structures		
Primary Containment (2.4.1)	Yes	
Reactor Building (2.4.2)	Yes	
Ambulance Building	No	The Ambulance Building is a single story prefabricated sheet metal structure founded on reinforced concrete slab on grade. The building is used for storage of an ambulance and considered non-safety related seismic Class II structure. The structure does not perform an intended function delineated in 10 CFR 54.4 (a).

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Breathing Air Compressor Building	No	The Breathing Air Compressor Building is a single story prefabricated sheet metal structure founded on reinforced concrete mat foundation. The structure houses the Breathing Air System, which provides purified compressed air for use by plant personnel during maintenance for respiratory supply and for pneumatic tools. The building is classified non-safety related seismic Class II structure. The structure does not perform an intended function delineated in 10 CFR 54.4 (a).
Chlorination Facility (2.4.3)	Yes	
Condensate Transfer Building (2.4.4)	Yes	
Dilution Structure (2.4.5)	Yes	
Discharge Structure and Canal	No	The Discharge Structure and Canal is comprised of a discharge concrete transition structure at the outlet of the circulating water discharge tunnels and a canal, which returns discharged water from the plant to Barnegat Bay. The discharge structure and canal is non-safety related, Seismic Class II structure. It is separated from the intake structure and canal and is not considered a part of the Ultimate Heat Sink (UHS). Failure of the Discharge Structure and Canal will not adversely impact the intended function of Intake Structure and Canal. The Discharge Structure and Canal does not perform an intended function delineated in 10 CFR 54.4 (a).
Domestic Water Facility	No	The Domestic Water Facility is a single story steel structure enclosed with metal siding. The facility houses Domestic Water Distribution system components and chemicals required for chemical treatment of deep well water to satisfy potable water standards, and for distribution of the water to the plant. The facility does not perform an intended function delineated in 10 CFR 54.4 (a).

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Emergency Diesel Generator Building (2.4.6)	Yes	
Exhaust Tunnel (2.4.7)	Yes	
Fire Pond Dam (2.4.8)	Yes	
Fire Pumphouses (2.4.9)	Yes	
Fish Sample Pool	No	The Fish Sample Pool consists of a reinforced concrete pool connected to the Intake Structure and Canal by steel troughs, which collect fish from the intake structure traveling water screen for sampling and testing to meet objectives of the Oyster Creek Environmental Technical Specifications Paragraph 3.1.2.B," Impingement of Organisms". The pool is classified non-safety related, Seismic Class II. Its failure would not adversely impact the safety related Intake Structure and Canal and would not prevent accomplishment of an intended function defined delineated in 10 CFR 54.4 (a)
Heat Exchanger Building	No	The Heat Exchanger Building is a steel structure erected against the south wall of the New Radwaste building. The building is enclosed on the remaining three sides with metal siding and supported on reinforced concrete slab on grade, partially supported from the Pipe Tunnel, which runs directly under the building. The building is classified non-safety related, Seismic Class II. The purpose of the building is to provide structural support, shelter, and protection for the New Radwaste Closed Cooling Water (NRWCCW) system heat exchangers and supporting systems. Scoping of systems inside the building determined that they do not perform an intended function delineated in 10 CFR 54.4 (a) and failure of the building will not adversely impact the intended function of the in scope New Radwaste building.

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Heating Boiler House (2.4.10)	Yes	
Independent Spent Fuel Storage Installation	No	The Independent Spent Fuel Storage Installation (ISFSI) consists of reinforced concrete Horizontal Storage Modules (HSM), a storage pad, an approach slab, drainage system, temperature monitoring system, security systems, and perimeter intrusion detection system. ISFSI is provided for the purpose of storing and handling of Dry Shielded Canisters (DSC), NUHOMS 61BT dual purpose (storage and transport) dry fuel storage system. ISFSI is designed to 10 CFR 72.212 Requirements, Licensed under general provisions of 10CFR72.210. Renewal of ISFSI license is not included in this application.
Intake Structure and Canal (2.4.11) (Ultimate Heat Sink)	Yes	
Low Level Radwaste Facility	No	The Low Level Radwaste Storage Facility is a two-story steel structure enclosed with reinforced concrete walls or precast concrete panels. The facility is comprised of five function areas, which include a cell storage area, a dry active waste storage area, a service head area, a dry active waste compaction area and a truck bay. The primary purpose for the facility is to house packaged low level radwaste generated at Oyster Creek in a retrievable mode during such time that access to low level radwaste burial sites in not available. A secondary function of the facility is to provide for temporary storage of reusable radioactive contaminated equipment and materials. It is classified non-safety related, designed to limit off-site radiation exposure below levels of 10CFR50 Appendix I. Scoping of the facility and systems it houses determined that they do not perform an intended function delineated in 10 CFR 54.4 (a).

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Maintenance Buildings	No	The Maintenance buildings consist of the Maintenance Building and the Old Machine Shop. The Maintenance Building is an added 2-story structure that is constructed of reinforced concrete, masonry block, and structural steel. The Old Machine Shop is a part of the original design and is comprised of a single story steel structure enclosed with metal siding and is supported on a slab on grade. The buildings house equipment and tools used by maintenance personnel to repair, refurbish, test and calibrate mechanical, electrical and I&C components. The Maintenance building also provides office space and facilities for maintenance personnel and electrical and I&C technicians. The buildings are non-safety related, designed to commercial standards.
Material Storage Buildings	No	The Material Storage Buildings consist of the materials warehouse, the storage building, and Level D Storage area. The materials warehouse is a two-story structure constructed of masonry block, structural steel, and enclosed with metal siding. The structure is supported on reinforced concrete footings. The storage building is a single story steel structure enclosed with metal siding and is supported on reinforced concrete slab on grade. The Level D Storage area is a slab on grade open to weather except for a small area, which is covered by a metal canopy. The purpose of the Material Storage buildings is to provide facilities for receiving, inspection, and storage of components, materials, and commodities required for replacement and plant modifications. The buildings do not house plant systems, or systems that interface or support plant systems. They are classified non-safety related designed to commercial grade standards. Scoping of the Material Storage Buildings determined they do not perform an intended function delineated in 10 CFR 54.4(a).
Miscellaneous Yard Structures (2.4.12)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Monitoring and Change Facility	No	The Monitoring and Change Facility (MAC) is located adjacent to northwest corner of the Reactor Building. The facility consists of a commercial double trailer supported on masonry block footings. The Monitoring and Change Facility is a control point for monitoring personnel and materials that exit radiation areas. The facility houses non-safety related equipment, including personnel contamination monitors, manual friskers, equipment friskers, computer terminals, and electronic personal monitors and readers. The facility also contains laundry bins and scrubs which are worn as required by plant procedures. The facility is classified non-safety related designed to commercial grade standards. Its failure will not impact the adjacent reactor building. Scoping of the Monitoring and Change Facility determined it does not perform an intended function delineated in 10 CFR 54.4(a).
New Radwaste Building (2.4.13)	Yes	
New Sample Pumphouse	No	The New Sample Pumphouse is a single story steel structure, enclosed with metal siding and supported on reinforced concrete slab on grade. The New Sample Pumphouse is classified non-safety related, Seismic Class II. The New Sample Pumphouse provides structural support, shelter, and protection to non-safety related liquid Radwaste system components and its supporting systems. Major components housed in the pumphouse include two high purity waste sample pumps, and two chemical waste distillate sample pumps. The pumps are provided to recirculate, recycle within the plant, or discharge to the environment the content of high purity waste sample or the chemical waste distillate sample tanks. Scoping of the Radwaste system determined that the components do not perform an intended delineated in 10 CFR 54.4 (a). Since the pumphouse houses components that do not perform an intended function and its failure would not prevent accomplishment of an intended function, the New Sample Pumphouse does not perform an intended function defined in 10 CFR 54.4 (a).

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Off Gas Building	No	The Offgas Building is a two-story steel structure enclosed with metal siding and masonry block walls. The interior intermediate floor and the roof are reinforced concrete slabs. Foundation for the building is reinforced concrete slab on grade, with an integrated pipe chase tunnel for routing of piping underneath the building. Interior walls required for shield are constructed of reinforced concrete or solid concrete blocks. The building is classified non-safety related, Seismic Class II. The building provides structural support, shelter, and protection for non-safety related Augmented Off-Gas (AOG) system components and the Augmented Off-Gas Closed Cooling Water system (AOGCCW) components. The AOG system is designed to reduce radioactive gaseous waste emissions to levels in compliance with 10CFR50, Appendix I. The AOGCCW system provides cooling water to the AOG system components Scoping of AOG system and the AOGCCW system determined that the systems do not perform an intended function delineated in 10 CFR 54.4 (a). The Offgas building is not credited for mitigating the consequences of potential failure of the AOG system in the current licensing bases. As a result the Offgas Building does not perform an intended function defined in 10 CFR 54.4 (a).
Office Building (2.4.14)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Old Radwaste Building	No	The Old Radwaste building is a single story reinforced concrete structure with a two-story penthouse. The building is linked to the Reactor building, Turbine, and the New Radwaste buildings by underground pipe tunnels. The building is supported on reinforced concrete slab foundation. The building is classified non-safety related, Seismic Class II. The Old Radwaste building was designed to provide structural support, shelter, and protection for non-safety related Radwaste system components required for processing, storage, and handling of liquid radwaste. However, after completion of the New Radwaste building, the Old Radwaste building is no longer used for processing and normal radwaste handling activities, but some of the equipment in the building is used for waste compaction and transfer. Certain areas of the building have been decontaminated and designated for storage of non-waste radioactive materials. Scoping of the Radwaste system determined that portions of the systems inside the Old Radwaste building do not perform an intended function delineated in 10 CFR 54.4 (a). Thus failure of the Seismic Class II building would not prevent accomplishment of an intended defined in 10 CFR 54.4 (a). The building is not credited for mitigating the consequences of a potential failure of the Radwaste system in the current licensing bases. As a result the Old Radwaste building does not perform an intended function defined in 10 CFR 54.4 (a).

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Other Office Buildings	No	Other Office Buildings include the 3-story Administration building, Rad Pro building, Contractor building, AOB Annex, Drywell Support center, and the Outage Support center. The 3-story Administration building is a steel structure constructed to commercial standards. The architecturally pleasing structure is located south of the reactor building inside the protected area. The Rad Pro building is a single story steel framed structure enclosed with metal siding. The Contractor building, AOB Annex, Drywell Support center, and the Outage Support center consist of single story commercial grade modular steel structures supported on concrete foundation. The purpose of the buildings is to house and provide office facilities for site management, design engineering, system engineering, and other plant support personnel. The 3-story administration building also houses the site document control center and the cafeteria. The buildings are non-safety related and their failure would not prevent accomplishment of an intended function delineated in 10 CFR 54.4 (a).
Oyster Creek Substation (2.4.15)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Pipe Tunnel	No	The Pipe Tunnel consists of an underground reinforced concrete box structure that connects the New Radwaste building to the Old Radwaste building. The tunnel is continuously supported on soil, and is classified non-safety related, Seismic Class II structure. The Pipe Tunnel provides structural support, shelter, and protection for piping and components of the Radwaste System, Heating & Process Steam system, Water Treatment & Distribution system, and non-safety electrical conduits routed to the New Radwaste building. Scoping of the Radwaste system, Water Treatment & Distr. system, and Heating & Process Steam system, determined that portions of the systems inside the Pipe Tunnel do not perform an intended function delineated in 10 CFR 54.4 (a). The tunnel is not credited for mitigating the consequences of a potential failure of the Radwaste system piping in the current licensing bases. Thus failure of the Seismic Class II Pipe Tunnel would not prevent accomplishment of an intended defined in 10 CFR 54.4 (a). As a result the Pipe Tunnel does not perform an intended function defined in 10 CFR 54.4 (a)

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Pretreatment Facility	No	The Pretreatment Facility consists of a single story steel structure enclosed with metal siding and two adjacent slabs on grade. The structure is supported from a reinforced concrete perimeter grade beam and a slab on grade. The adjacent slabs, one each side of the structure, are reinforced concrete on grade with a perimeter grade wall and sumps below grade. The facility is classified non-safety related, Seismic Class II. The Pretreatment Facility provides support, shelter, and protection to the non-safety related pretreatment and domestic water system components. Major components within the facility includes the domestic water tank, coagulator & clearwell tank, caustic pump and tank, acid pump and tank, filters, and tanks for hypochlorite and soda ash storage. The two systems are subsystems of, and evaluated with the Water Treatment & Distribution license renewal system. Scoping of the Water Treatment & Distr. System determined that subsystems within the pretreatment facility do not perform an intended function delineated in 10 CFR 54.4 (a). As a result failure of the Seismic Class II pretreatment facility would not prevent an intended defined in 10 CFR 54.4 (a).

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
RAGEMS Buildings	No	RAGEMS (Radioactive Gaseous Effluent Monitoring System) buildings consist of the Ventilation Stack RAGEMS building and the Turbine building RAGEMS building. The buildings consist of small steel structures enclosed with metal siding that are supported on reinforced concrete slabs. The two structures are classified non-safety related Seismic Class II. The buildings provide structural support, shelter, and protection for the non-safety related components of the Ventilation Stack RAGEMS and the Turbine building RAGEMS. Scoping of the Radiation Monitoring system determined that the Ventilation Stack RAGEMS and the Turbine building RAGEMS ensure that plant releases do not exceed the limits specified in 10 CFR Part 20 and 10 CFR 50 Appendix I. The systems do not perform an intended function delineated in 10 CFR 54.4 (a). Since the buildings house components that do not perform an intended function and their failure would not prevent accomplishment of an intended function, the buildings do not perform an intended function defined in 10 CFR 54.4 (a).
Respirator Facility	No	The Respirator Facility is a single story commercial grade modular steel structure supported on concrete foundation. The purpose of the facility is to house equipment and personnel required for cleaning used respirators, their associated hoses, and filters. The facility and the equipment do not perform an intended function delineated in 10 CFR 54.4(a)

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Security Structures	No	The Security Structures consist of the security building, the north guard house, the personnel processing center, the ballistic resistant enclosures, and guard sheds. The structures are a part of Oyster Creek physical security required by 10CFR73. The purpose of Security structures is to provide shelter and facilities for the plant security force and equipment required to control access into the protected area, surrounded by a perimeter security fence, as required by 10CFR73. The security building also provides a single entry and exit point for radiation areas of the plant. Scoping of the Security structures determined that the structures do not perform an intended function delineated in 10 CFR 54.4 (a)
Site Emergency Building	No	The Site Emergency Building is a two story steel framed structure with reinforced concrete, masonry block, and precast concrete panels on the outside of the building. The interior load bearing walls are either reinforced concrete or reinforced masonry block walls. The interior partition walls are either masonry block walls or metal stud and gypsum wallboard. The non-safety related, Seismic Class II building is partitioned to provide onsite Technical Support Center (TSC), rooms for equipment and communication associated with its operation, Plant Computer System, and office facilities for the emergency response team. Scoping of the building determined that it does not perform an intended function as delineated in 10 CFR 54.4 (a).
Turbine Building (2.4.16)	Yes	
Ventilation Stack (2.4.17)	Yes	
Component Supports Commodity Group (2.4.18)	Yes	
Piping and Component Insulation Commodity Group (2.4.19)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Electrical Components		
120/208 Volt Non-Essential distribution System (2.5.1.1)	Yes	
120VAC Vital Power System (2.5.1.2)	Yes	
125V Station DC System (2.5.1.3)	Yes	
24/48V Instrument Power DC System (2.5.1.4)	Yes	
4160V AC System (2.5.1.5)	Yes	
480/208/120V Utility (JCP&L) Non-Vital Power (2.5.1.6)	Yes	
480V AC System (2.5.1.7)	Yes	
Alternate Rod Injection System (ARI) (2.5.1.8)	Yes	
Canal Water Temperature Monitoring System	No	
Cathodic Protection System	No	
Electrical Commodities (2.5.2)	Yes	
Electrical Heat Trace System	No	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Grounding and Lightning Protection System (2.5.1.9)	Yes	
Intermediate Range Monitoring System (2.5.1.10)	Yes	
Lighting System (2.5.1.11)	Yes	
Local Power Range Monitoring System/Average Power Range Monitoring System (2.5.1.12)	Yes	
Offsite Power System (2.5.1.13)	Yes	
Plant Annunciator System	No	
Plant Computer System	No	
Post-Accident Monitoring System (2.5.1.14)	Yes	
Radio Communications System (2.5.1.15)	Yes	
Reactor Manual Control System	No	
Reactor Overfill Protection System (ROPS) (2.5.1.16)	Yes	
Reactor Protection System (2.5.1.17)	Yes	
Remote Shutdown System (2.5.1.18)	Yes	

Table 2.2-1 Plant Level Scoping Results

System, Structure or Commodity Group	In Scope?	Comments
Rod Worth Minimizer	No	
Source Range Monitoring System	No	
Station Blackout System (2.5.1.19)	Yes	

2.3 SCOPING AND SCREENING RESULTS: MECHANICAL

2.3.1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

The following systems are addressed in this section:

- Control Rods (Section 2.3.1.1)
- Fuel Assemblies (Section 2.3.1.2)
- Isolation Condenser System (Section 2.3.1.3)
- Nuclear Boiler Instrumentation (Section 2.3.1.4)
- Reactor Head Cooling System (Section 2.3.1.5)
- Reactor Internals (Section 2.3.1.6)
- Reactor Pressure Vessel (Section 2.3.1.7)
- Reactor Recirculation System (Section 2.3.1.8)

2.3.1.1 Control Rods

System Purpose

The Control Rods are replaceable, mechanical components consisting of cruciform-shaped stainless steel assemblies containing neutron-absorbing material, designed to be used for flux shaping and for reactivity control during reactor startup, power level changes, and shutdown. The Oyster Creek reactor contains 137 control rods. The purpose of the control rods is to absorb neutrons in the reactor core, thereby providing the means to adjust core power shape, compensate for reactivity changes caused by fuel and burnable poison depletion, and fully shut down the nuclear reaction. They accomplish this purpose, in conjunction with their positioning system (evaluated with the Control Rod Drive System), by providing continuous regulation of the core excess reactivity and reactivity distribution, and by providing sufficient reactivity compensation to render the reactor adequately subcritical from its most reactive condition.

System Operation

The control rods are comprised of four stainless steel wings assembled in a cruciform configuration. Each wing assembly may consist of stainless steel tubes covered with a sheath, or multiple extruded stainless steel tubes laser welded into a wing assembly depending on blade model. The tubes contain boron carbide neutron absorbing material. Hafnium plates, strips, or rods are also used in high duty locations of the wings in some control rod models. Each control rod has a handle assembly located at the top, and a velocity limiter at the bottom. The velocity limiter is designed to limit control rod free-fall velocity yet have a minimal restricting effect on motion during rod insertion. The velocity limiter is a fabricated conically shaped assembly permanently attached to the bottom of the absorber section of the control rod, and contains the socket assembly for attachment of the control rod to the control rod drive. The velocity limiter acts as a large clearance piston in the control rod guide tube (evaluated with Reactor Internals) to restrict free-fall velocity of the control rod. In this manner, the energy release associated with the positive reactivity insertion during a rod drop accident can not exceed an evaluated maximum, which results in no system damage and presents minimal offsite dose consequences. The restrictive force presented by the velocity limiter during control rod insertion is sufficiently low that a reactor scram will result in a high rate of negative reactivity insertion.

The Control Rod Drive System positions the control rods axially in the core, from fully inserted to fully withdrawn or to any of a number of intermediate positions. Each control rod location is in the center of a group of four fuel assemblies (evaluated with Fuel Assemblies), comprising a “cell”. Each rod is capable of being individually positioned, but the usual practice is to position groups of rods throughout the core to provide reactivity adjustment and flux shaping for optimum power distribution and fuel utilization. Near the end of an operating cycle when core excess reactivity is at a minimum, all rods are withdrawn to maintain rated reactor power (or highest achievable power if lower than rated) until scheduled shutdown for refueling. Control rod absorption of neutrons chemically depletes the absorber material, and control rod lifetime is monitored. Upon reaching prescribed thresholds, control rods are scheduled for replacement during refueling outages.

For more detailed information, see UFSAR sections 4.3.2.4 and 4.6.4.3.

System Boundary

The Control Rod license renewal boundary consists of the entire control rod and velocity limiter assembly.

Not included in the scoping boundary of the Control Rods is the Control Rod Drive System or the Fuel Assemblies, which are separately evaluated as license renewal systems, or the control rod guide tubes, which are evaluated with Reactor Internals.

Reason for Scope Determination

The Control Rods meet 10 CFR 54.4(a)(1) because they are safety related components that are relied upon to remain functional during and following design basis events. They do not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the control rods could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). They do not meet 10 CFR 54.4(a)(3) because they are not required to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Introduce negative reactivity to achieve or maintain subcritical reactor condition. 10 CFR 54.4(a)(1)

UFSAR References

4.3.2.4
4.6.4.3

License Renewal Boundary Drawings

None

Table 2.3.1.1 Control Rods
Components Subject to Aging Management Review

Component Type	Intended Functions
None (Control Rods do not require Aging Management Review because they are short-lived components.)	Not Applicable

2.3.1.2 Fuel Assemblies

System Purpose

The Fuel Assemblies are high integrity components containing the fissionable material that sustains the nuclear reaction when the reactor core is made critical. The purpose of the fuel assemblies is to allow efficient heat transfer from the nuclear fuel to the reactor coolant and to maintain structural integrity providing a controllable, coolable bundle geometry and fission product barrier. They accomplish this purpose by satisfying the thermal-mechanical, nuclear, and hydraulic requirements of the nuclear fuel design conditions within the reactor.

The Oyster Creek reactor contains 560 fuel bundle assemblies. During each refueling outage, approximately one-third of the highest depletion bundles are replaced and the positions of the remaining bundles are shuffled as required by the nuclear core design to optimize cycle energy, operating conditions, and fuel economics. Cycle-specific evaluations of the thermal-mechanical design known as supplemental reload licensing submittals are produced to assure that the safety and operational requirements of the fuel product line are met.

System Operation

Each Fuel Assembly is comprised of a fuel bundle and a channel that surrounds it. The fuel rods of each bundle are spaced and supported in a square array by the stainless steel upper and lower tie plates and intermediately placed Zircaloy spacer assemblies. Oyster Creek contains both 8x8 and 9x9 arrayed bundles. The upper tie plate has a handle used for transferring the bundle from one location to another. The lower tie plate has a nosepiece which supports the fuel assembly in the reactor. The lower tie plate may incorporate a debris filter grid. The fuel rods used in the assembly consist of high-density ceramic uranium dioxide fuel pellets stacked within Zircaloy cladding, evacuated and backfilled with helium and sealed with welded Zircaloy end plugs. The core reload design specifies the U-235 pellet enrichments used to reduce local peak-to-average fuel rod power ratios. Selected fuel rods within each reload bundle may also incorporate gadolinium as burnable poison. Three types of fuel rods may be used in a fuel bundle; a standard fuel rod with pin-type ends, tie rods with threaded ends that engage the lower tie plate and extend through the upper tie plate to be fastened with nuts and lock tabs, and part-length rods that by design do not extend the full length of the bundle. Water rods may be located in the center of the bundle array, and are used to provide increased neutron moderation.

The bundle channel is fabricated from Zircaloy and provides the flow path outer periphery for bundle coolant flow, supplies structural stiffness to the bundle and transmits seismic loadings to the core internal structures, provides a heat sink during a LOCA, and supplies a surface for control rod guidance within the reactor core. A channel fastener attaches the channel to the bundle at the upper tie plate. Finger springs may be used at the channel-to-lower tie plate interface to control bypass flow. Channels may be a uniform thickness or a thick-thin design with heavier gauge corners and lighter gauge side surfaces. Channel spacing is provided by means of spacer buttons located on the upper portion of the channel.

For more detailed information, see UFSAR section 4.2.2.

System Boundary

The Fuel Assembly license renewal boundary consists of the entire fuel bundle and channel assembly.

Not included in the scoping boundary of the Fuel Assemblies are the fuel support pieces, top guide, or other core internal structures which are evaluated with Reactor Internals.

Reason for Scope Determination

The Fuel Assemblies meet 10 CFR 54.4(a)(1) because they are safety related components that are relied upon to remain functional during and following design basis events. They do not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the fuel assemblies could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). They do not meet 10 CFR 54.4(a)(3) because they are not required to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), and station blackout (10 CFR 50.63).

System Intended Functions

1. Maintain reactor core assembly geometry. The Fuel Assemblies assure integrity of the nuclear fuel configuration, maintaining a coolable geometry and providing a cladding barrier to contain the fission products released from the fuel throughout the design life of the fuel rod. 10 CFR 54.4(a)(1)

UFSAR References

4.2.2

License Renewal Boundary Drawings

None

Table 2.3.1.2 Fuel Assemblies
Components Subject to Aging Management Review

Component Type	Intended Functions
None (Fuel Assemblies do not require Aging Management Review because they are short-lived components.)	Not Applicable

2.3.1.3 Isolation Condenser System

System Purpose

The Isolation Condenser System (ICS) is a standby, high pressure system designed for removal of fission product decay heat when the reactor vessel is isolated from the Main Condenser. This condition can occur when the Main Steam Isolation Valves (MSIVs) have closed or the Main Condenser is otherwise unavailable for use as a heat sink.

The purpose of the system is to prevent overheating of the reactor fuel, control the reactor pressure rise, and limit the loss of reactor coolant through the relief valves. The ICS accomplishes this purpose by depressurizing the reactor and removing residual and decay heat. ICS operation is initiated automatically by reactor vessel high pressure or low-low water level, or can be initiated manually.

No single failure in the system can cause both Isolation Condensers to malfunction. The ICS is credited in the mitigation of the effects of a loss of feedwater, and Isolation Condenser System and Reactor Water Cleanup System high energy line breaks. Operation of the ICS is not credited in the 10CFR50 Appendix K evaluation.

System Operation

The ICS is comprised of two independent loops, each with one condenser shell containing two tube bundles. When a loop is in operation, both tube bundles are in service. For ICS initiation, normally both condensers are placed in operation simultaneously, and either loop can be activated or shutdown separately by manual control. Each loop has separate steam and condensate lines and isolation valves, separate shell steam vents, redundant steam line vent isolation valves, and separate instrumentation and controls. The ICS operates by natural circulation without the need for driving power other than the DC electrical system used to open an isolation valve on each condensate return line, initiating ICS operation. Steam flows from the reactor vessel through the condenser tubes, and condensate returns by gravity to the reactor vessel, forming a closed loop. The valves in the steam inlet lines are normally open so that the tube bundles are at reactor pressure. Only the DC motor operated isolation valve on each condensate return line is normally closed, and is the only component that needs to be activated to initiate operation of each loop from standby. The shell side of each heat exchanger contains water filled to a level above the tube bundles. During ICS operation, the water in the shell side boils and vents to atmosphere though vent piping exiting the Reactor Building east wall. During normal plant operations, when the ICS system is in standby, makeup to the shell side is from the Water Treatment and Distribution System. During ICS operation, makeup is provided from the Condensate Transfer System. Alternate makeup sources are also available from the Fire Protection and Core Spray systems, interfacing through the Condensate Transfer System. (Each of these makeup sources is separately evaluated as a license renewal system.)

Each steam supply line (one for each loop) is attached to the reactor vessel at the steam zone. Two normally open isolation valves are in each steam supply line. The single steam supply line for each isolation condenser separates into two lines, one for each of the two tube bundles in each condenser shell. During ICS operation, steam from the reactor vessel condenses in the tube bundles as heat is transferred to the water in the shell side of the condensers. The two condensate return lines from the tube bundles of each condenser join together to form a common condensate return line, one for each loop. Each condensate return line has two isolation valves in series, and a locked open manual maintenance block valve. The condensate return line isolation valve outside the containment is a normally closed dc motor operated valve. The condensate return line isolation valve inside containment is a normally open ac motor operated valve. Only the one normally closed valve in each loop needs to open to place that loop of ICS in operation. Each isolation valve can be manually operated from the control room; manual demand from the control room overrides the automatic signal. The condensate return path from condenser “A” is through the Reactor Recirculation System loop A suction line, and the condensate return path from condenser “B” is through the Shutdown Cooling System supply piping line which attaches to the Reactor Recirculation System loop E suction line. (Each of these systems is evaluated separately as a license renewal system.)

The ICS steam supply path is from the reactor vessel at the steam zone; the steam supply lines are separate from the main steam headers so that ICS steam line condensation does not cause entrainment of liquid in the steam supply to the turbine. High points in the steam supply lines are vented to the main turbine steam header downstream of the MSIVs when the plant is operating and the ICS is in standby. This allows removal of noncondensible gases from the reactor steam that would otherwise collect at these high points. These high point vent lines isolate automatically upon initiation of ICS system operation or upon receipt of a main steam line isolation signal.

Steam from the shell side of the condensers, created from heat transferred during ICS operation, is vented to atmosphere through vent piping exiting the Reactor building east wall. Condenser “A” has two vents from the shell that combine into one larger line before exiting the Reactor Building. Condenser “B” has two vents that are run separately outside the Reactor Building. All three vent lines are provided with bird screens attached to the external piping ends.

Each steam supply line from the reactor vessel and each condensate return line to the recirculation suction piping is equipped with high flow isolation instrumentation, to provide isolation of the ICS in the event of a line break outside the primary containment. The high flow detection is made using differential pressure readings from elbow taps on the system piping. A high flow signal from either the steam supply line or the condensate return line will send an isolation signal to close all four isolation valves on the loop where the signal was generated. Manual isolation is required in the event that tube leakage is discovered. Symptoms of tube leakage could include changing shell side level, increasing shell side temperature, detection of radioisotopes in the shell side water, or increasing area radiation.

For more detailed information, see UFSAR Sections 3.6.2.6 and 6.3.

<u>System Boundary</u>

The tube side boundary of the ICS begins with each loop’s steam supply piping attachment at the reactor vessel, continues through the tube bundles, and as condensate return piping, condenser loop “A” returns directly to an attachment point on Reactor Recirculation System loop A suction piping, while condenser loop “B” returns to an attachment point on the Shutdown Cooling System supply line which in turn attaches to Reactor Recirculation System loop E suction piping. Included in this boundary are the isolation valves on both the steam side and condensate return piping, and the high point vent lines from the steam supply piping to the normally open isolation valve at the Main Steam System north ("A") header. The shell side boundary includes the condenser shell, atmospheric vent lines, makeup piping from the Condensate Transfer System, and the vent, drain, sample, overflow, and hose station lines.

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

Not included in the ICS license renewal scoping boundary are the following systems, which are separately evaluated as license renewal systems:
Main Steam System
Reactor Pressure Vessel
Reactor Recirculation System
Shutdown Cooling System
Water Treatment and Distribution Systems
Condensate Transfer System
Core Spray System
Fire Protection System

Reason for Scope Determination

The Isolation Condenser System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), and station blackout (10 CFR 50.63). The Isolation Condenser System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62).

System Intended Functions

1. Remove residual heat from the reactor coolant system. Provides fission product decay heat removal when the reactor vessel is isolated from the Main Condenser, and assists in mitigating loss of feedwater, ICS HELB and RWCU HELB. 10 CFR 54.4(a)(1)
2. Provide reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
3. Provide primary containment boundary. Provides primary containment boundary; provides isolation from a high flow signal in the event of an IC pipe break outside containment. 10 CFR 54.4(a)(1)
4. Resist nonsafety-related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)
5. Relied upon to demonstrate compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
6. Relied upon to demonstrate compliance with the commission's regulations for Environmental

Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)
7. Relied upon to demonstrate compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

3.6.2.6
6.3

License Renewal Boundary Drawings

LR-GE-148F262
LR-BR-2002 sheet 2
LR-BR-2004 sheet 2

Table 2.3.1.3 Isolation Condenser System
Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Filter
Closure bolting	Mechanical Closure
Gauge Snubber	Pressure Boundary
Heat Exchangers (isolation condensers)	Heat Transfer
	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.1.2.1.1 Isolation Condenser System
-Summary of Aging Management Evaluation

2.3.1.4 Nuclear Boiler Instrumentation

System Purpose

The Nuclear Boiler Instrumentation system is an instrumentation system designed to provide the means to measure parameters of level, pressure, temperature, flow, core differential pressure, and core spray pipe integrity. The purpose of the system is to provide signals to the Reactor Protection System and Emergency Core Cooling System (ECCS) logic, for initiation of protective system functions such as reactor scram, ECCS and Engineered Safety Feature (ESF) system initiation, primary containment isolation, recirculation pump trip, and alternate rod insertion. The FW control function is provided input from this system. Nuclear Boiler Instrumentation also provides the operator with indications of reactor level, pressure, temperature, and flow during normal and transient conditions to support procedural activities performed during normal and post-accident operation. It accomplishes these purposes by utilizing specific instruments to monitor level, pressure (including differential pressure), flow, and temperature.

System Operation

Reactor vessel level is measured by comparing the differential pressure between the variable level of water in the reactor vessel and the pressure from a reference water column of a known height. Both the variable leg and the reference leg experience the same applied steam pressure from the reactor vessel. Steam from the vessel enters the upper instrument tap of the reference leg and condenses in a chamber to keep the reference leg filled with water, with overflow returned to the vessel. Reference legs are compensated for temperature-induced variations in water density as required. The difference in the measured pressures is processed into the vessel water level measurement.

Reactor pressure is measured by pressure instruments utilizing the same piping that is used to measure the pressure in the water level instrument reference legs.

Temperature is measured through thermocouples placed in specific locations on the reactor vessel shell, heads, flange, and skirt to provide indication of the vessel metal temperature.

Reactor core differential pressure is measured by instrumentation that compares pressure below the core plate (in the liquid poison system line) with pressure above the core plate. Core spray piping integrity between the core shroud and reactor vessel wall is monitored by measuring differential pressure between the top of the core support plate and the Core Spray Sparger.

Reactor pressure vessel head flange gasket leak detection is measured by a level switch mounted inside the drywell and a pressure indicator located outside the drywell.

For more detailed information, see UFSAR section 7.6.1.1.

System Boundary

The Nuclear Boiler Instrumentation system boundary begins at the individual reactor vessel nozzles and other attachment points, continues through the instrument piping and tubing, and ends with the instrument(s) to which the sensing lines are routed. The boundary for the wide range level instrument reference leg begins with its condensing chamber, since the boundary of Main Steam head vent piping (evaluated with the Main Steam System) continues up to the condensing chamber. The boundary for the core plate differential pressure instrumentation begins at the sensing lines' attachment points on the liquid poison supply line, which is evaluated with the Standby Liquid Control System (Liquid Poison System). The Nuclear Boiler Instrumentation boundary includes all associated piping, condensing chambers, isolation valves, excess flow check valves, local instrument racks, and mounted instruments for monitoring the specific parameters. The mechanical, electrical, and instrument and control components within the boundary are included. The Nuclear Boiler Instrumentation system boundary also includes the thermocouples monitoring reactor vessel temperature.

Also included in the license renewal scoping boundary of the Nuclear Boiler Instrumentation system are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included in the scoping boundary of the Nuclear Boiler Instrumentation system are the main steam line differential pressure instruments (evaluated with the Main Steam System) which provide a flow signal to the Reactor Protection System. Also not included in the scoping boundary of the Nuclear Boiler Instrumentation system are the Suppression Pool Temperature Monitoring System, Relief Valve/Safety Valve Acoustical Monitoring System, containment pressure monitoring, and torus water level monitoring (all evaluated with the Post-Accident Monitoring System). Also not included in the scoping boundary of the Nuclear Boiler Instrumentation system is reactor coolant pressure boundary leakage monitoring instrumentation which is evaluated with the Drywell Floor and Equipment Drains. Not included in the scoping boundary of the Nuclear Boiler Instrumentation system are the recirculation loop flow and pump seal pressure instruments, which are evaluated with the Reactor Recirculation System. As previously discussed, not included in the scoping boundary of the Nuclear Boiler Instrumentation System is the Main Steam head vent piping up to the wide range level instrument condensing chamber, since this piping is evaluated with the Main Steam System.

Not included in the scoping boundary of the Nuclear Boiler Instrumentation system are the following interfacing systems, which are separately evaluated as license renewal systems:
Reactor Internals
Standby Liquid Control System (Liquid Poison System)
Post-Accident Monitoring System

Reason for Scope Determination

The Nuclear Boiler Instrumentation System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

System Intended Functions

1. Provide reactor coolant pressure boundary. Reactor Vessel pressure and differential pressure sensing lines attach to reactor vessel nozzles or other RCPB piping. 10 CFR 54.4(a)(1)
2. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. Provides input signals to RPS, ECCS, and containment isolation for reactor control to prevent safety limits from being exceeded. 10 CFR 54.4(a)(1)
3. Provide primary containment boundary. Sensing lines penetrating primary containment are provided with isolation valves and excess flow check valves. 10 CFR 54.4(a)(1)
4. Provide motive power to safety related components. Power supplies condition electric power input for use by instrumentation components. 10 CFR 54.4(a)(1)
5. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)
8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Anticipated Transients Without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)
9. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

7.6

License Renewal Boundary Drawings

LR-GE-148F712
LR-GE-237E798

Table 2.3.1.4 Nuclear Boiler Instrumentation
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Condensing chamber	Pressure Boundary
Gauge Snubber	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.1.2.1.2 Nuclear Boiler Instrumentation
-Summary of Aging Management Evaluation

2.3.1.5 Reactor Head Cooling System

System Purpose

The Reactor Head Cooling System (RHCS) is designed to be used in conjunction with reactor vessel flooding and the Shutdown Cooling System for condensing steam formed in the vessel head and for cooling the flanges and the upper portions of the reactor pressure vessel during shutdown operation.

The purpose of the RHCS is to condense steam and condensable gases in the vessel dome to assist in vessel head cooling during shutdown, prevent repressurization as the vessel is flooded to levels above the vessel flange and main steam nozzles to cool the upper portions of the vessel metal, and permit reactor pressure to be reduced to atmospheric while reducing vessel head temperature. A cross connect line between the head cooling line and the head vent line prevents accumulation of hydrogen and other non-condensable gases in the head cooling line above the reactor vessel during normal power operation.

System Operation

The RHCS is comprised of a single spray nozzle located inside the top of the reactor pressure vessel head, which sprays through a cone angle which does not strike the head metal surface. The head spray water is supplied by the standby Control Rod Drive System (CRDS) feed pump. Head spray flow is measured by a flow element, indicated in the Control Room, and controlled by a pneumatically operated flow control valve. The RHCS is connected to the vessel head nozzle by a pipe spool piece which also includes an integral spray nozzle. A check valve is installed as the primary isolation valve inside the drywell. A second isolation valve outside the drywell is an air operated, fail-closed, globe valve which is remotely controlled from the control room. Manually operated stop valves separate the RHCS piping from the Control Rod Drive (CRD) feed pump discharge lines. A leak-off line is used for system drainage and to check for leakage through the isolation valves.

During normal reactor operation, the stop valves connecting the RHCS to the CRDS are both closed, and both air operated valves in the RHCS line are also closed. The isolation check valve in the RHCS line, the closed valves and water in the head spray piping prevent reactor steam from entering the CRDS. The first air operated valve upstream of the isolation check valve is the outboard isolation valve. RHCS piping from the outboard isolation valve to the connections to the CRD feed pump discharge lines is drained during normal operation. During shutdown, when the spare CRD feed pump is needed for RHCS operation, the stop valves and air operated valves are manually repositioned. If the CRD feed pump supplying CRDS fails, the valving is changed manually to give priority to the rod drives, thereby removing the RHCS from service. During reactor head cooling system operation a small amount of water is diverted to the reactor head vent nozzle through a cross connect line. A restriction orifice in the cross connect line limits flow to prevent thermal shock.

For more detailed information, see UFSAR Section 5.4.11.

System Boundary

The RHCS scoping boundary begins at its connection to the CRDS at the downstream side of the two stop valves located between the CRD feed pump discharge lines, and terminates at the spool piece flange. It includes the cross connect line line between the head cooling line and the head vent line of the Main Steam system. All associated piping, components and instrumentation contained within the flow path described above are included in the RHCS scoping boundary.

Also included in the license renewal scoping boundary of the RHCS are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the RHCS scoping boundary are the following interfacing systems which are separately evaluated as license renewal systems:
Control Rod Drive System
Main Steam System
Reactor Pressure Vessel: RHCS vessel head nozzle
Reactor Internals: Pipe spool piece with integral spray nozzle

RHCS piping, components and instrumentation from the RHCS connections to the CRD pump discharge lines downstream to, but not including, the pipe spool piece with spray nozzle are required to accomplish the system intended functions and are therefore in the scope of license renewal.

Reason for Scope Determination

The RHCS meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The RHCS meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of functions identified for 10 CFR 54.4(a)(1). The RHCS meets 10 CFR 54.4(a)(3) because it is relied upon to demonstrate compliance with the Commission's regulations for environmental qualification (10 CFR 50.49).

The RHCS is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62), fire protection (10 CFR 50.48), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
2. Provide primary containment boundary. 10 CFR 54.4(a)(1)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)
4. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)

UFSAR References

5.4.11

License Renewal Boundary Drawings

LR-GE-237E487
LR-BR-2002 sheet 1

Table 2.3.1.5 Reactor Head Cooling System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Flow Element	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.1.2.1.3 Reactor Head Cooling System
-Summary of Aging Management Evaluation

2.3.1.6 Reactor Internals

System Purpose

The reactor internals provide support for the core and other internal components, maintain the fuel in a coolable geometry during normal and accident conditions, and provide proper distribution of the coolant delivered to the vessel.

System Operation

The shroud is a stainless steel cylinder that surrounds the reactor core and provides a barrier to separate the upward flow of the coolant through the reactor core from the downward recirculation flow. Bolted on top of the shroud is the steam separator assembly, which forms the top of the core discharge plenum. This provides a mixing chamber before the steam-water mixture enters the steam separator. The recirculation outlet and inlet plenum are separated by the shroud support ring (support cone), which joins the bottom of the shroud to the vessel wall. The cone support ring carries all the vertical weight of the shroud, steam separator and dryer assembly, upper core grid (top guide), bottom core support plate, and the peripheral fuel assemblies. The shroud support ring also sustains the differential upward pressure loading on the shroud under operating conditions and the vertical and lateral seismic loads developed during an earthquake.

The control rod guide tubes extend up from the control rod drive housing through holes in the core plate. Each tube is designed as a lateral guide for the control rod and as the vertical support for the fuel support piece, which holds the four fuel assemblies surrounding the control rod. Except for the weight of the peripheral fuel assemblies, the entire weight of the fuel is carried by the guide tubes, and is transmitted to the bottom head through the Control Rod Drive (CRD) housings and stub tubes. For more detail see UFSAR Section 3.9.5.

System Boundary

The boundary for the reactor internals includes all components that are inside the reactor vessel except the fuel assemblies and the control blades, both of which are short-lived components and are evaluated separately. This includes the major components described above plus additional components such as the feedwater spargers, the core spray spargers, the standby liquid control system sparger, the head spray integral nozzle, the inlet recirculation flow diffuser, incore nuclear instrumentation tubes, and reactor internals modification/repair hardware. The incore instrumentation (SRM - Source Range Monitoring, IRM - Intermediate Range Monitoring, LPRM - Local Power Range Monitor, and TIP - Traveling In-core Probe) is evaluated as separate license renewal systems.

The following components of reactor internals perform a safety related function and therefore are within the scope of license renewal: the shroud and shroud repair hardware; shroud support ring, core spray spargers, piping and clamps, core support plate and core support plate wedges, fuel support piece, control rod guide tubes and housings, upper core grid (top guide), and incore instrumentation tubes and housings. The steam dryer is also included in the scope of license renewal. The steam dryer does not perform a safety related function, however, it is included in the license renewal scope, because failure of the steam dryer could potentially prevent satisfactory accomplishment of the safety related functions of the components mentioned above.

The following components of reactor internals are not required to support intended functions and are not included within the scope of license renewal: the feedwater sparger; the steam separator, Standby Liquid Control System (SLCS) sparger, the head spray integral nozzle, the surveillance capsule holders, and core inlet diffuser(flow baffle). A safety assessment for these components has been performed and reported in BWRVIP-06. BWRVIP-27 also provides a safety assessment of the SLCS sparger. These evaluations concluded that these components do not perform a safety related function. These reports also conclude that failure of these components will not result in consequential failure of any safety related equipment. The inlet diffuser is not evaluated in the BWRVIP documents, however, similar reasoning used in BWRVIP-06 when applied to the inlet diffuser results in a similar conclusion. The diffuser does not perform a safety related function nor is it credited any of the regulated events. No failure of the diffuser has been postulated that could cause subsequent failure of safety related equipment.

The control rod drive mechanisms are separately evaluated with the license renewal system Control Rod Drive System (CRDS).

Reason for Scope Determination

The Reactor Internals meet 10 CFR 54.4(a)(1) because the internals are relied to function during and following design basis events. The steam dryer meets 10 CFR 54.4(a)(2) because failure of this non-safety related component could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Internals meet 10 CFR 54.4(a)(3) because the core spray piping and sparger are relied on for compliance the Commission's regulation for Fire Protection (10 CFR 50.48). The Reactor Internals are not relied upon in any safety analysis or plant evaluation to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62) or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide reactor coolant pressure boundary. The CRD housings and incore dry tubes and housings provide a reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
2. Provide emergency core cooling where the equipment provides coolant directly to the core. The Core Spray piping and spargers distribute emergency core cooling flow to the core. 10 CFR 54.4(a)(1)
3. Maintain reactor core assembly geometry. The reactor internal components in conjunction with the reactor vessel are designed to provide physical support for the fuel, steam dryer and other components and to maintain fuel configuration and clearances during normal and accident conditions. Maintaining core geometry ensures adequate core cooling capability and that the control rod drives can be inserted to maintain reactivity control. 10 CFR 54.4(a)(1).
4. Relied upon in safety analyses or plant evaluations to perform to a function that demonstrates compliance with the commissions regulations for Fire Protection (10 CFR 50.48). The Core Spray sparger and piping inside the reactor vessel is credited for core cooling in the protection safe shutdown analysis. 10 CFR 54.4(a)(3)
5. Introduce negative reactivity to achieve or maintain subcritical reactor condition. The control rod mechanisms insert negative reactivity for normal shutdown and for mitigation of operational transients and accidents. The reactor internals are designed to maintain core geometry during normal and accident conditions and support proper insertion of control rods. 10 CFR

54.4(a)(1).

6. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function - nonsafety-related portions of system could interact with safety-related piping and systems. 10 CFR 54.4(a)(2)

UFSAR References

3.9.5
4.5.2

License Renewal Boundary Drawings

See UFSAR Figure 3.9-8

Table 2.3.1.6 **Reactor Internals**
Components Subject to Aging Management Review

Component Type	Intended Functions
Control Rod Drive Assembly (Housing and Guide Tube)	Pressure Boundary
	Structural Support
Core Plate (Lower Core Grid)	Structural Support
Core Plate (Lower Core Grid) Wedges	Structural Support
Core Shroud	Pressure Boundary
	Structural Support
Core Spray Line Spray Nozzle Elbows	Pressure Boundary
Core Spray Lines, Thermal Sleeves, Spray Rings (Sparger), and Spray Nozzles	Pressure Boundary
	Spray
	Structural Support
Core Spray Ring (Sparger) Repair Hardware	Structural Support
Fuel Support Piece	Direct Flow
	Structural Support
Incore Neutron Monitor Dry Tubes,Guide Tubes, & Housings	Pressure Boundary
Shroud Repairs (tie rods and lug/clevis assemblies)	Structural Support
Shroud Support Structure	Pressure Boundary
	Structural Support
Top Guide (Upper Core Grid)	Structural Support
Vessel Steam Dryer	Structural Support

The aging management review results for these components are provided in
Table 3.1.2.1.4 Reactor Internals
-Summary of Aging Management Evaluation

2.3.1.7 Reactor Pressure Vessel

System Purpose

The reactor pressure vessel (RPV) contains the reactor core, the reactor internals, and reactor core coolant moderator. The RPV forms part of the reactor coolant pressure boundary (RCPB) and serves as a high-integrity barrier against leakage of radioactive materials to the drywell.

System Operation

The reactor pressure vessel is a vertical, cylindrical pressure vessel with hemispherical heads. The cylindrical shell and bottom hemispherical head of the reactor pressure vessel are of welded construction and are fabricated of low alloy steel plate. The removable top head is attached to the cylindrical shell flange with studs and nuts and includes two concentric seal rings in the head flange. The reactor pressure vessel is supported by a steel skirt. The top of the skirt is welded to the bottom of the vessel. The base of the skirt is continuously supported by a ring girder fastened to a concrete foundation, which carries the load through the drywell to the Reactor Building foundation slab.

The major safety function for the reactor pressure vessel is to provide a radioactive material barrier. The RPV also contains and supports the reactor core, reactor internals and coolant moderator. The RPV provides support for the connected RCPB piping.

For additional details see UFSAR Sections 5.1 and 5.3.

System Boundary

The boundary for the reactor pressure vessel includes the vessel shell and flange, top head and flange, bottom head, vessel closure studs and nuts, vessel nozzles (recirculation, main steam, feedwater, control rod drive return line, head spray and others), nozzle safe ends (including thermal sleeves), vessel penetrations (Control Rod Drive stub tubes, standby liquid control, bottom head drain and others), vessel skirt, vessel shell course welds and vessel attachment welds. The vessel flange leak detection is evaluated as part of the Nuclear Boiler Instrumentation System. The remainder of the RCPB (including reactor recirculation, main steam, feedwater, core spray, control drive, head spray) beyond the RPV boundary is evaluated with the respective license renewal system.

Reason for Scope Determination

The reactor pressure vessel meets 10 CFR 54.4(a)(1) because the vessel is relied upon to remain functional during and following design basis events. The reactor pressure vessel does not meet 10 CFR 54.4(a)(2) because there are no non-safety-related components whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The reactor pressure vessel meets 10 CFR 54.4(a)(3) because the vessel is relied on for compliance with the Commission's regulation for Fire Protection (10 CFR 50.48). The reactor pressure vessel is not relied upon in any safety analysis or plant evaluation to perform a function that demonstrates compliance with the Commission's regulation for EQ (10 CFR 50.62), ATWS (10 CFR 50.62) or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide reactor coolant pressure boundary. The reactor pressure vessel maintains the integrity of the reactor coolant pressure boundary (RCPB). The reactor pressure vessel provides structural support for connected RCPB piping. 10 CFR 54.4(a)(1)
2. Maintain reactor core assembly geometry. The reactor pressure vessel in conjunction with the reactor internals provides physical support for the core and other reactor vessel internals and a means to distribute coolant to the fuel assemblies in the core. 10 CFR 54.4(a)(1)
3. Relied upon in safety analyses or plant evaluations to perform to a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The reactor pressure vessel is credited in the fire safe shutdown analysis. 10 CFR 54.4(a)(3)

UFSAR References

5.1
5.3

License Renewal Boundary Drawings

See UFSAR Figure 3.9-8

Table 2.3.1.7 Reactor Pressure Vessel
Components Subject to Aging Management Review

Component Type	Intended Functions
Nozzle (Bottom head drain)	Pressure Boundary
Nozzle Safe Ends (Core Spray, Isolation Condenser & CRD Return)	Pressure Boundary
Nozzle Safe Ends (Feedwater & Main Steam)	Pressure Boundary
Nozzle Safe Ends (Recirculation Inlet & outlet)	Pressure Boundary
Nozzle Thermal Sleeves (CRD Return Line)	Direct Flow
Nozzle Thermal Sleeves (Feedwater Nozzle)	Direct Flow
Nozzles (Core Spray)	Pressure Boundary
Nozzles (CRD Return)	Pressure Boundary
Nozzles (Feedwater)	Pressure Boundary
Nozzles (Main Steam & Isolation Condenser)	Pressure Boundary
Nozzles (Recirculation Inlet & Outlet)	Pressure Boundary
Penetrations (CRD Stub Tubes)	Pressure Boundary
	Structural Support
Penetrations (Instrumentation including safe ends)	Pressure Boundary
Penetrations (Standby Liquid Control)	Pressure Boundary
RPV Support Skirt and Attachment Welds	Structural Support
Top Head Closure Studs and Nuts	Mechanical Closure
Top Head Enclosure (Head & Nozzles)	Pressure Boundary
Top Head Enclosure Vessel Flange Leak Detection Penetration	Pressure Boundary
Top Head Flange	Pressure Boundary
Vessel Bottom Head	Pressure Boundary
Vessel Shell (Upper, upper intermediate, lower intermediate, lower, and belt line welds)	Pressure Boundary
Vessel Shell Attachment Welds	Structural Support
Vessel Shell Flange	Pressure Boundary

The aging management review results for these components are provided in
Table 3.1.2.1.5 Reactor Pressure Vessel
-Summary of Aging Management Evaluation

2.3.1.8 Reactor Recirculation System

System Purpose

The Reactor Recirculation System (RR) is a reactivity control system that provides forced circulation of reactor coolant through the core. The Reactor Recirculation System consists of the Reactor Recirculation main loop piping, recirculation pumps and motors, recirculation motor-generator sets, Recirculation System Flow Control, and Recirculation Pump Trip Logic.

The purpose of the Reactor Recirculation System is to provide forced circulation of reactor coolant through the core, providing a means to control reactor power within a limited range without the need for manipulation of the control rods. It accomplishes this purpose by delivering recirculated water flow to the reactor vessel through five separate pumped loops, each with an individually controllable variable speed pump.

System Operation

The Reactor Recirculation System is comprised of five separate recirculation loops, and has been sized to provide a total flow capacity equal to the required flow at rated load. Each loop contains suction and discharge piping, a motor-operated suction isolation valve, motor-driven recirculation pump, motor-operated discharge isolation valve, a bypass line around the discharge isolation valve equipped with a motor-operated bypass valve, and associated instrumentation and drain valves. Each recirculation pump is a centrifugal unit with a mechanical cartridge-type two-stage shaft seal. Each recirculation pump is driven by a variable speed motor powered by a recirculation motor-generator (MG) set, comprised of a constant speed motor, synchronous generator, interconnecting variable speed fluid coupling, and associated instrumentation and controls.

Under normal reactor power conditions, all five recirculation loops are in operation, with all pumps operating at the same speed. Plant operation has been analyzed with up to two recirculation loops out-of service.

The flowpath for recirculated coolant through each of the five loops is as follows: reactor coolant exits the vessel through the loop's outlet nozzle and into the recirculation pump suction piping. The coolant then passes through the recirculation pump and returns to the vessel via the discharge piping. The coolant enters the vessel through the loop's lower head inlet nozzle, passes through the diffuser and orifices at the bottom of the core and flows upward through the core where bulk boiling produces steam. The steam-water mixture enters the moisture separators and the steam dryers. The water separated from the steam flows downward across the top of the plenum, where it mixes with the incoming feedwater, and enters the downcomer annulus between the shroud and the vessel wall. The coolant flows downward through the annulus to the outlet nozzles, repeating the path.

The recirculation pump motor oil coolers and recirculation pump seal coolers are provided cooling water from the Reactor Building Closed Cooling Water System. Recirculation pump suction and discharge isolation valve leakoff connections and pump seal leakoff connections are piped to the Drywell Equipment Drain Tank.

If the suction and discharge valves of all five recirculation loops are closed, a level reduction in the core region will not result in a corresponding level reduction in the downcomer where reactor vessel level is measured. For this reason, the suction and discharge valves of at least one recirculation loop are required to be open when vessel level indication is required for ECCS operability.

Recirculation Flow Control is a speed control unit consisting of a pneumatic operator for each fluid coupling scoop tube, an electric tachometer on each generator shaft, a remote manual speed controller for each MG set, a master remote control device for the five pumps, and associated electronic equipment. Operating speeds of the five pumps are normally adjusted in unison by the master speed controller. The individual speed controller is used for taking a pump out of service or returning it to normal operation. The tachometer on each generator shaft provides a feedback signal for comparison of actual versus selected speeds.

Recirculation Pump Trip (RPT) is an instrument-controlled function of the Reactor Recirculation System that decreases the pressure and temperature transient during an ATWS event. The Reactor Protection System (RPS – separately evaluated as a license renewal system) supplies a signal to the RPT system causing a trip of all five recirculation pumps on a vessel low-low level signal. On a vessel high-pressure signal from RPS, RPT trips three recirculation pumps immediately, and trips the remaining two pumps after a time delay if the vessel high-pressure condition still exists. If the high pressure condition is a temporary spike, having two recirculation pumps continue to operate is desirable as it provides better core cooling, more representative level and temperature instrument indications in the core region, and reduced thermal cycling of the reactor vessel and internal components.

For more detailed information, see UFSAR sections 5.4.1 and 7.6.

System Boundary

The boundary of the portion of the Reactor Recirculation System includes the main recirculation flowpath, which begins at the reactor vessel outlet nozzles, continues through the suction piping, suction valves, recirculation pump casings, discharge valves (including bypass valves and piping around the discharge valves), and discharge piping back to the inlet nozzles on the vessel. The temperature elements at each pump suction and discharge are located in thermowells. Included in the boundary are the instrument lines from the pressure taps on the pump suction and discharge lines, and from the flow element instrument pressure taps on each discharge line, out to the isolation valves located outside of containment. Also included are the pump casing drain lines up to and including the isolation valves, and the instrument lines from the recirculation pump seals up to and including the isolation valves outside of containment.

Included in the RR System license renewal scoping boundary for evaluation is the RPT system. The RPT system is an instrument-controlled function of the RR System, and the portion that supports performance of the RR System intended function during an ATWS event is in scope for license renewal. The components of the RPT system are evaluated as electrical commodities.

Also included in the RR System license renewal scoping boundary are the recirculation MG sets, comprised of the constant speed motors, synchronous generators, variable speed fluid couplings, oil coolers, and associated components for control (Recirculation Flow Control). The function of these components is to supply electrical power for operation of the recirculation pump motors inside the containment.

Included in the license renewal scoping boundary of the RR System are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building and Primary Containment. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included in the Reactor Recirculation System boundary is piping beyond the attachment points where the following systems, each separately evaluated for license renewal, interface with Recirculation system piping or components: Shutdown Cooling supply and return piping to the Recirculation Loop E suction and discharge lines, respectively; Isolation Condenser Loop A condensate return attachment to Recirculation Loop A suction piping (Isolation Condenser Loop B piping attaches to the Shutdown Cooling supply line described above); Reactor Water Cleanup supply and return piping to Recirculation Loop B suction and discharge lines, respectively; and Reactor Building Closed Cooling Water lines from their attachment points on the pump seal coolers and pump motor oil coolers. Also not included is the Post-Accident Sampling supply piping beyond the isolation valve on the line attached to the Recirculation Loop A suction piping.

Not included in the Reactor Recirculation System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Drywell Floor and Equipment Drain System
Post-Accident Sampling System
Reactor Water Cleanup System
Isolation Condenser System
Shutdown Cooling System
Reactor Protection System
Reactor Building Closed Cooling Water System

Reason for Scope Determination

The Reactor Recirculation System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48) and ATWS (10 CFR 50.62). Pressure boundary integrity of the Reactor Recirculation System is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for station blackout (10 CFR 50.63). The system is not relied upon to perform a function that demonstrates compliance with the Commission’s regulations for environmental qualification (10 CFR 50.49).

The function of the MG set and Recirculation Flow Control portions of the Reactor Recirculation System is to provide regulated electrical power to operate the recirculation pump motors. These portions of the Reactor Recirculation System are not in scope under 10 CFR

54.4(a)(1) because they are nonsafety-related systems that are not relied upon to remain functional during and following design basis events. The MG set portion is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). MG set and Recirculation Flow Control portions are not in scope under 10 CFR 54.4(a)(3) because they are not relied upon in safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
2. Provides primary containment boundary - piping from pressure taps for determining pump developed pressure and flow exit the containment and have globe isolation valves and excess flow check valves outside containment. 10 CFR 54.4(a)(1)
3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Reactor Recirculation system (RPT) includes the associated pump trip actuation logic. 10 CFR 54.4(a)(1)
4. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Anticipated Transients without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)
7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). Recirculation system operation is not required for SBO, however the pressure boundary integrity of the flowpath must be maintained to support other SBO-required systems. 10 CFR 54.4(a)(3)

UFSAR References

5.4.1
7.6.1
7.6.2

License Renewal Boundary Drawings

LR-GE-237E798
LR-GE-107C5339
LR-BR-M0012
LR-GE-148F262
LR-BR-2006 Sheet 5

Table 2.3.1.8 Reactor Recirculation System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Coolers (oil)	Leakage Boundary
Filter Housing (oil)	Leakage Boundary
Flow Element	Pressure Boundary
Fluid Drive (MG Set Coupling) - Reservoir	Leakage Boundary
Oil Mist Eliminator - Reservoir	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing	Pressure Boundary
Sight Glasses (oil)	Leakage Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.1.2.1.6 Reactor Recirculation System
-Summary of Aging Management Evaluation

2.3.2 ENGINEERED SAFETY FEATURES SYSTEMS

The following systems are addressed in this section:

- Automatic Depressurization System (Section 2.3.2.1)
- Containment Spray System (Section 2.3.2.2)
- Core Spray System (Section 2.3.2.3)
- Standby Gas Treatment System (SGTS) (Section 2.3.2.4)

2.3.2.1 Automatic Depressurization System

System Purpose

The Automatic Depressurization System (ADS) is a standby Emergency Core Cooling system (ECCS) that is designed to provide a controlled blowdown of the primary system to rapidly reduce pressure during a small pipe break. Depressurization following a LOCA permits the low pressure Core Spray System to achieve timely rated flow of injection water into the reactor core so that fuel clad melting is prevented. For larger breaks the vessel depressurizes sufficiently to permit Core Spray injection without ADS assistance. The ADS equipment also provides an overpressure protection function for the reactor pressure vessel.

The purpose of the ADS is to depressurize the reactor coolant system, either during a small break LOCA or in the event of an overpressure condition in the reactor pressure vessel. The ADS accomplishes this purpose by opening the electromatic relief valves (EMRVs) to provide a controlled blowdown of the primary coolant system and rapidly reduce reactor vessel pressure during a small pipe break or overpressure condition. Additionally, manual ADS actuation of the EMRVs is credited for pressure control during an isolation condenser high energy line break.

The ADS is one of the systems that comprise the ECCS and as such is designed to function throughout the post accident period. Operation of the system is credited in the 10CFR50 Appendix K and other evaluations. No single failure in the system will prevent the ADS from performing its design basis function.

System Operation

The ADS is comprised of the logic relays, timers, and instrumentation that receive process signal input and provide actuation signals to the five EMRV assemblies (evaluated with the Main Steam System) located on the Main Steam headers upstream of the Main Steam Isolation Valves. Each EMRV assembly consists of a main valve, a pilot valve and a solenoid operator.

The ADS automatic depressurization function, the overpressure function and the manual operation of the EMRVs are all controlled through the ADS logic network. During normal reactor operation (ADS in standby), the EMRVs are closed. ADS initiation for automatic depressurization begins after sensing simultaneous occurrence of high drywell pressure, triple low water level in the reactor pressure vessel, and differential pressure at a core spray booster pump on either core spray loop. There is a time delay before the EMRVs open to allow for operator action to prevent ADS-initiated opening of the EMRVs if appropriate.

In addition, opening of any EMRV will begin immediately upon receipt of either a high pressure condition as sensed by the valve's associated pressure sensor, or a manually initiated signal. The overpressure sensing opening function for each EMRV can be defeated, or individual valves can be manually opened from the control room.

When ADS actuates the EMRVs, a signal is sent to the solenoid-operated EMRV pilot valve, opening the pilot valve and venting steam from under the main valve disc. This creates a differential pressure that opens the main valve. Steam flows down the discharge header (evaluated with the Main Steam System) to the torus and exits below the surface of the water in the suppression pool through Y-quenchers (evaluated with the Main Steam System).

The125 VDC distribution system provides the source of electrical power to the ADS relay logic and the EMRV solenoids. Redundant power supplies with an automatic power transfer feature are provided to assure system operation.

A valve position monitoring system allows the status of the EMRVs to be ascertained from the Control Room. Accelerometers and temperature monitoring instrumentation are used to determine whether EMRVs are relieving steam to the torus.

For more detailed system information see UFSAR Sections 3.6.2.6.1, 5.2.2, 6.3.1.2, and 7.3.1.

System Boundary

The ADS system boundary is electrical, and is comprised of the logic relays, timers, and instrumentation that receive process signal input and provide actuation signals to the five (5) EMRV assemblies. The mechanical system boundary, which includes the EMRV assemblies, vacuum breakers, and inlet and discharge piping and associated components are evaluated with the Main Steam System, and the Y-quenchers located in the torus are evaluated with the Main Steam System.

Not included in the ADS license renewal scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Core Spray System
Main Steam System

Reason for Scope Determination

The Automatic Depressurization System (ADS) meets the scoping requirements of 10 CFR 54.4(a)(1) because it is a safety-related system which is relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commissions regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49) and station blackout (10 CFR 50.63). The ADS is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62).

System Intended Functions

1. Provide emergency core cooling where the equipment provides coolant directly to the core. ADS works in concert with the Core Spray System to provide injection following a LOCA or Isolation Condenser HELB event. 10 CFR 54.4(a)(1)
2. Provide reactor coolant pressure boundary. The ADS overpressure function actuates EMRVs to control primary system pressure. 10 CFR 54.4(a)(1)
3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The ADS system includes the associated actuation logic. 10 CFR 54.4(a)(1)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR

50.49). 10 CFR 54.4(a)(3)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

3.6.2.6.1
5.2
6.3
7.3

License Renewal Boundary Drawings

None

2.3.2.2 Containment Spray System

System Purpose

The Containment Spray System is a standby system designed to be used with the Core Spray System as a means of removing the reactor core decay heat from the containment in the event of a LOCA. The Emergency Service Water (ESW) System provides cooling for the containment spray heat exchangers thereby providing the heat sink for the energy released during a LOCA. Containment Spray System has the alternate capability of cooling the water in the torus pool during normal, shutdown and post-accident conditions.

The purpose of the system is to remove fission product decay heat from containment. It accomplishes this by taking water from the torus pool, which is pumped through the Containment Spray heat exchangers, and discharged through spray nozzles into the containment as well as the option through the full flow test line, which is an alternate mode. Decay heat is removed from the core by the core spray water and transported to the drywell, where the core spray water and containment spray water mix and flow down the vents to the torus pool. The containment spray heat exchangers then remove the heat from the pool and direct it to the Emergency Services Water System.

The Containment Spray System is a manually actuated system.

System Operation

The Containment Spray System is comprised of two redundant loops that deliver water from the torus pool to the spray headers in the drywell and torus. Each loop consists of two pumps in parallel, two heat exchangers in parallel, and two drywell spray headers and a torus spray header. In addition, both loops share a common suction header from the torus pool and a common spray header in the torus. Each loop has two connected ring headers at two elevations inside the drywell. Each Containment Spray System contains a full flow test line. Flow and pressure instrumentation are provided in the control room for each loop. The Containment Spray System piping and components in the pressure boundary are considered an extension of the Primary Containment.

The Containment Spray System is manually initiated from switches in the Control Room. The Containment Spray Pumps can be started manually for Containment Spray Service if the proper containment spray initiation permissives are met. Two independent mode select switches are provided, one for each loop. Each switch has two modes, “Drywell Spray” and “Torus Cooling”.

The main flow path for each loop of the two loop Containment Spray System starts from the torus through three suction strainers. The torus penetration nozzles from the suction strainers are connected to a suction header, which nearly surrounds the torus. The suction lines for each Containment Spray pump connect to this header. The Core Spray pumps also take suction from this header. When the proper containment spray initiation permissives are met, the normally closed motor operated valves can be opened and the containment spray pump can be started to allow the drywell spray mode flow path, which sprays the containment. In addition, the Containment Spray System has the capability in the torus cooling mode of providing cooling of the water in the torus by manual operation of a motor operated valve to direct water from the torus pool through the pumps and heat exchanger and return the water to the torus pool through torus-to-drywell vacuum relief piping [evaluated with Containment Vacuum Breakers System]. Water entering the torus and the drywell gravity drains back to the torus pool to complete the cycle. Thus the water is pumped from the torus pool through the suction strainers to the heat exchangers, sprayed into the containment as well as a potential flow path to the full flow test line and flows by gravity back to the torus pool. The water spray removes latent and sensible heat from the drywell and torus. The heat is rejected back to the Emergency Service Water System to the Ultimate Heat Sink via the Containment Spray heat exchangers.

Each Containment Spray loop with redundant components is supported by separate and redundant ESW Cooling Systems. The ESW System supplies the cooling water to the Containment Spray heat exchangers. The ESW pumps are throttled as necessary to allow for a positive tube-to-shell pressure differential. This differential pressure in the heat exchangers minimizes the radioactive leakage to the environment subsequent to a LOCA in the event of a tube leak.

Each Containment Spray System corner room pump compartment is provided with coolers sized to extract the heat generated by pump operation. Cooling water supplied in these coolers is evaluated with the Reactor Building Closed Cooling Water System. Air flow path for these coolers is evaluated with the Reactor Building Ventilation System.

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

System Boundary

The boundary of the Containment Spray System begins with the suction strainers located inside Primary containment and the pump suction lines to the ring header that is common to the Core Spray System and Containment Spray suction piping. It continues through the containment spray pumps' suction lines, through the pumps, the shell side of the heat exchangers and to the discharge piping, where each containment spray loop attaches to either the Drywell or the Torus and ends at the drywell headers or the torus spray header. Included in this boundary is the piping & spray headers located inside the torus, the piping and spray headers located inside the Drywell and the full flow test line on each loop from the common header downstream of the heat exchangers to its attachment to the torus-to-drywell vacuum relief piping. All associated piping and components within the flow paths and subsystems described above are included in the Containment Spray system boundary. Additionally, the Containment Spray System boundary also includes the pressure differential monitoring piping and components between the Containment Spray System and the ESW system at the heat exchangers.

Not included in the Containment Spray System license renewal scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Emergency Service Water System
Containment Vacuum Breakers System

Reason for Scope Determination

The Containment Spray System meets the scoping requirements of 10 CFR 50.54(a)(1) because it is a safety-related system which is relied upon to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 50.54(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commissions regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49). The Containment Spray System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62) or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide emergency heat removal from primary containment and provide containment pressure control. 10 CFR 50.54 (a)(1)
2. Provide primary containment boundary. The Containment Spray System piping and components in the pressure boundary are considered an extension of the primary containment. 10 CFR 50.54(a)(1)
3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Containment Spray system includes the associated actuation logic. 10 CFR 54.4(a)(1)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

UFSAR References

6.2.2
1.2.2.2
6.2.1
3.1.34
3.2
6.5.2

License Renewal Boundary Drawings

LR-GE-148F740
LR-BR-2005 Sheet 4
LR-GU-3E-243-21-1000

Table 2.3.2.2 Containment Spray System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Flow Element	Pressure Boundary
Piping and fittings	Leakage Boundary Pressure Boundary
Pump Casing	Pressure Boundary
Spray Nozzle	Pressure Boundary
	Spray
Strainer (ECCS Suction)	Filter
	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.2.2.1.1 Containment Spray System
-Summary of Aging Management Evaluation

2.3.2.3 Core Spray System

System Purpose

The Core Spray (CS) System is a low pressure Emergency Core Cooling System (ECCS) designed to provide cooling water for removal of decay heat from the reactor core following a postulated Loss-of-Coolant Accident (LOCA). Large-to-intermediate pipe breaks in the reactor coolant system result in a reactor pressure reduction sufficient to permit the CS System to achieve its rated injection flow prior to fuel cladding melt. To accommodate the remaining intermediate-to-small pipe breaks, the Automatic Depressurization System provides the initial controlled depressurization to reduce reactor pressure, and thus permit timely CS injection. In this manner, the CS System provides core cooling such that fuel clad melting is prevented for the entire spectrum of postulated LOCAs. The CS System provides a supply of cooling water to the reactor core which is independent of the Feedwater System and which can be operated on emergency power.

The purpose of the CS System is to provide for the post-LOCA removal of decay heat from the reactor core so that fuel clad melting is prevented for the entire spectrum of postulated LOCAs. The CS System accomplishes this purpose by delivering a low-pressure spray pattern over the fuel following a LOCA, limiting peak clad temperature. The CS System operation is initiated automatically by either reactor low-low water level or high drywell pressure, or can be initiated manually.

The CS System is a two-loop system. No single failure in the CS System can cause both loops to malfunction. Operation of the CS System loops is credited in the 10 CFR 50 Appendix K evaluation.

System Operation

The CS System is comprised of two independent loops. Each loop consists of two main pumps, two booster pumps, and associated piping, valves, instrumentation, and controls. Main pump suction is through strainers located in the torus (evaluated with the Containment Spray System), and booster pump discharge is through the system isolation valves into spray spargers located inside the reactor shroud (evaluated with Reactor Internals). Each CS System loop contains full flow test, keep-fill, and minimum flow pump protection features. Flow and pressure instrumentation are provided in the control room for each loop. All motor operated valves in the main flowpath of each loop are normally open during system standby, with the exception of the parallel system isolation valves located outside the drywell. The core spray system piping and components in the pressure boundary are considered an extension of the primary containment boundary.

Initiation of both loops of the CS System occurs upon receipt of a high drywell pressure or low-low reactor vessel level signal. These signals also start both Emergency Diesel Generators (EDGs), in order to supply power to the Core Spray pumps in the event of loss of normal electric power supply. The CS System can also be initiated manually. If the suction and discharge valves of all five recirculation loops are closed, a level reduction in the core region will not result in a corresponding level reduction in the downcomer where the low-low reactor vessel level is measured. For this reason, the suction and discharge valves of at least one recirculation loop are required to be open when CS System is required to be operable as an ECCS system. Once the reactor pressure drops below a preset value and the CS System actuation signal is present, the parallel motor operated system isolation valves receive a permissive signal to open. Opening of the parallel motor operated system isolation valves completes the flowpath, and injection water from the two loops enters the vessel through two penetrations. Inside the vessel, each line extends half way around the outside of the core shroud with one loop penetrating the shroud above the other. The core spray spargers inside the shroud (evaluated with Reactor Internals) consist of two 180-degree segments. Thus each sparger forms a complete circle above the core.

The main flowpath for each CS System loop is suction from the torus through one of two main pumps, continuing through one of two booster pumps, through the outboard parallel system isolation valves, through the inboard parallel testable check valves, and into the reactor vessel for discharge onto the core through the associated spray sparger. Each of the parallel valves has 100% flow capacity, so active failure of one valve will not result in insufficient flow. Upon receipt of the initiation signal, one preferred main pump in each CS System loop starts. Should either of these main pumps fail to start, the second main pump in that loop will receive a signal to start. Upon sensing both an actuation signal and a discharge pressure signal of its associated main pump, the preferred booster pump will start. If the preferred booster pump in either loop fails to start, the alternate booster pump in that loop will receive a signal to start.

After CS System flow has been established into the vessel, the torus provides an essentially unlimited supply of cooling water. Water discharged from a pipe break inside the drywell will overflow through the drywell vents into the torus. An alternate supply of cooling water for the CS System is the Condensate Storage Tank through locked closed manual valves located at the suction of each CS System main pump. The Fire Protection System is also capable of delivering water to the reactor vessel using CS System piping. During CS System operation, the heat being absorbed by the water that flows back to the Torus is transferred to the Ultimate Heat Sink by the heat exchangers in the Containment Spray System.

The primary water supply piping for the CS System is attached to suction strainers in the torus (evaluated with the Containment Spray System). The water in the torus is drawn through three strainers into a common header. This header also feeds the Containment Spray System pumps. Each CS System corner room pump compartment is provided with coolers sized to extract the heat generated by pump operation. Cooling water supplied to these coolers is evaluated with the Reactor Building Closed Cooling Water System. Air flow path for these coolers is evaluated with the Reactor Building Ventilation System. Operation of these coolers is not required to support the CS System safety-related function.

For more detailed information, see UFSAR sections 6.3.1 and 6.3.1.3.

System Boundary

The CS System scoping boundary begins with the attachment points of the main pump suction lines to the ring header common to the CS System and Containment Spray System suction piping. It continues through the main CS System pumps' suction lines, through the main pumps and booster pumps to the discharge piping, where each CS System loop attaches to a reactor vessel nozzle. Included in this boundary is a full flow test line on each loop from the common header downstream of the booster pumps to its attachment to the torus-to-drywell vacuum relief piping. Also included is each loop's keep-fill piping which takes suction from the discharge of a CS System main pump in each loop, continues through the fill pump back into the main pump discharge line, and exits the CS System main flowpath piping though the minimum flow return line attached to the full flow test line. The CS System boundary includes the parallel motor operated system isolation valves outside containment, the parallel testable check valves inside containment, and associated piping, components, and instrumentation on each of the main flowpath, test, fill, and minimum flow lines described above. The alternate water supply flow path boundary with the Condensate Storage and Transfer System is at the interface located on the CS System main pump common suction line. The alternate water supply boundary with the Fire Protection System is at the normally closed manual isolation valves where the piping connects to the suction of Loop I booster pumps and the discharge of Loop II booster pumps. The boundaries with the Post- Accident Sampling System (PASS) extend to the first valve of the PASS downstream of each of the sampling connections to the CS System at the suction of the Loop I main pumps suction header and on the discharge of the Loop I booster pumps.

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

Not included in the scoping boundary of the CS System are the suction strainers and piping located inside the torus, and the ring (suction) header, which are included in the Containment Spray System scoping boundary. Also not included are the piping and spargers located inside the reactor vessel, which are included in the Reactor Internals scoping boundary. Not included in the CSS license renewal scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Automatic Depressurization System
Primary Containment System
Condensate Storage and Transfer System
Fire Protection Systems
Reactor Internals
Post Accident Sampling System
Containment Spray System

<u>Reason for Scope Determination</u>

The Core Spray System meets the scoping requirements of 10 CFR 54.4(a)(1) because it is a safety-related system which is relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commissions regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49) and station blackout (10 CFR 50.63). The Core Spray System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62).

System Intended Functions

1. Provide emergency core cooling where the equipment provides coolant directly to the core. Operates with Automatic Depressurization System (ADS) to accommodate entire spectrum of postulated LOCA breaks. Minimum flow capability provides pump protection to assure capability of ECCS function. 10 CFR 54.4(a)(1)
2. Provide primary containment boundary. 10 CFR 54.4(a)(1)
3. Provide reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
4. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Core Spray system includes the associated actuation logic. 10 CFR 54.4(a)(1)
5. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63) 10 CFR 54.4(a)(3)
7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48) 10 CFR 54.4(a)(3)
8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49) 10 CFR 54.4(a)(3)
9. Remove residual heat from the reactor coolant system. Provides a safety-related backup source of condensing (cooling) water to the Isolation Condensers. 10 CFR 54.4(a)(1) and 10 CFR 54.4(a)(3)

UFSAR References

6.3

License Renewal Boundary Drawings

LR-GE-855D781
LR-GU-3E-243-21-1000
LR-BR-2004 sheet 2
LR-BR-M0012
LR-GE-148F712

Table 2.3.2.3 Core Spray System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Cyclone Separator	Pressure Boundary
Flow Element	Pressure Boundary
Gauge Snubber	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (Fill Pumps)	Pressure Boundary
Pump Casing (Main and Booster Pumps)	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Sight Glasses	Leakage Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.2.2.1.2 Core Spray System
-Summary of Aging Management Evaluation

2.3.2.4 Standby Gas Treatment System (SGTS)

System Purpose

The Standby Gas Treatment System (SGTS) is a plant Engineered Safety Feature (ESF) ventilation system that filters and exhausts the Reactor Building atmosphere and drywell atmosphere to the stack during secondary containment isolation conditions and drywell purging operation.

The purpose of the system is to limit post-accident radioactive releases to the environs by collecting, filtering and transporting fission products to the plant stack for elevated release. It accomplishes this by maintaining a negative pressure of 0.25 inches of water within the Reactor Building with respect to the outside atmosphere to minimize unfiltered leakage of fission products from the Reactor Building and by exhausting filtered release of the primary and secondary containments through the Ventilation Stack. It is also used to purge primary containment prior to outages when increased radioactivity is present and is a backup to the Reactor Building Ventilation System for this function.

During normal operation, the Reactor Building Ventilation System is operating and the SGTS is in standby. During a Design Basis Accident (DBA), the SGTS fans are automatically started and effluents are filtered prior to release through the Ventilation Stack.

System Operation

The Standby Gas Treatment System (SGTS) is comprised of two separate filter trains, each having 100% capacity. Either of the two filter trains is considered as an installed spare, with the remaining one capable of the required flow capacity. Each SGTS train consists of an inlet isolation valve and a low flow orifice valve air intake, a pre-filter, an electric heating coil, a HEPA filter, a charcoal filter and another HEPA filter. Each train is exhausted by a separate exhaust fan with throttled damper through an outlet isolation valve to the Ventilation Stack. A cross-tie is located upstream of the fans and downstream of the filter bank of each train allowing either fan to draw through either filter train. The various elements act to filter and remove radioactive iodines and particulates that may be present in the Reactor Building atmosphere during and after an accident, and in the drywell and suppression chamber atmosphere after primary containment pressure is reduced. The system is also a backup to the Reactor Building Ventilation System's drywell and suppression chamber purge function for outages and is used when radioactivity is high.

The two independent filter trains are normally in standby as the Reactor Building Ventilation System maintains a negative pressure in the Reactor Building and discharges effluents out the Ventilation Stack. During a DBA, upon receipt of high drywell pressure or low-low reactor water level, the normal ventilation supply and exhaust fans are automatically tripped; the reactor building isolation valves (secondary containment isolation) are automatically closed, and the SGTS fans are automatically started to maintain a negative pressure in the secondary containment. The SGTS is also initiated by high level trips of radiation monitors located within the Reactor Building.

The individual SGTS trains can be placed in service manually from the control room, either in parallel with normal ventilation (for test) or with normal ventilation shutdown. Once initiated, either manually or automatically, the SGTS must be manually shutdown when no longer required. Normal ventilation must then be restarted manually.

Upon failure of an operating fan, the second fan will start automatically. The cross-tie valve will open automatically, the inlet and outlet valves of the failed fan will automatically close, and the inlet and outlet valves of the second fan will automatically open. Low flow air bleed will continue to flow through the orifice valve and the filter bank of the failed fan. Cooling air is drawn through the shut down train to remove the decay heat and prevent auto ignition of the charcoal, and the remainder of the flow is drawn through the operating train from the Reactor Building.

Each filter train draws from a common duct connected to the Reactor Building Ventilation System exhaust duct or the drywell and suppression chamber when so aligned (evaluated with Reactor Building Ventilation System). The effluents then are drawn through one of either trains filter banks through the exhaust fan where it is discharged through the Reactor Building Ventilation System exhaust ductwork to the Ventilation Stack.

All of the major components of this system, with the exception of the exhaust fans and outlet valves, are located in the Pipe Tunnel connecting the Turbine Building, Reactor Building, and Old Radwaste Building.

For more detailed information, see UFSAR Section 6.5.1.

System Boundary

The Standby Gas Treatment System (SGTS) boundary begins at the main exhaust header of the Reactor Building Ventilation System where it is drawn into the SGTS filter train intake header. Two parallel low flow orifice valve intake lines connect to the intake header, one for each SGTS filter train. The header is divided by air operated isolation valves to allow use of either filter train. The trains consist of a pre filter, a electric heating coil and a charcoal filter flanked by two HEPA filters. The air is then drawn through a throttled damper to a single exhaust fan in each train and then into an exhaust duct. A cross connect upstream of the fans with a single isolation valve allows either fan to draw from either filter train. The two exhaust ducts combine and the system ends at the connection to the Reactor Building exhaust fan EF-1-6 exhaust duct to the Ventilation Stack. A backdraft damper isolates the upstream Reactor Building Ventilation System from the SGTS effluents to the stack.

Not included in the Standby Gas Treatment System scoping boundary are the Reactor Building Ventilation System (ducts and valves), the Containment Inerting System (valves), the Containment Vacuum Breakers System (piping and valves) and the Ventilation Stack (elevated release) which are evaluated as separate license renewal systems.

Reason for Scope Determination

The Standby Gas Treatment System (SGTS) meets 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The Standby Gas Treatment System (SGTS) is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Standby Gas Treatment System (SGTS) meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the

Commission's regulations for Equipment Qualification (10 CFR 50.49). The Standby Gas Treatment System (SGTS) is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Control and treat radioactive materials released to the secondary containment. (Provides for controlled, elevated release of filtered building atmosphere under accident conditions.) 10 CFR 54.4(a)(1)
2. Provide secondary containment boundary. (Minimize ground level release of airborne radioactive materials by maintaining a negative pressure in the Reactor Building.) 10 CFR 54.4(a)(1)
3. Control combustible gas mixtures in the primary containment atmosphere. (Limit radioactive releases during purging of the drywell and suppression chamber post LOCA, after containment spray has reduced the drywell pressure to approximately 1 psig.) 10 CFR 54.4(a)(1)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Equipment Qualifications (10 CFR 50.49). 10 CFR 54.4(a)(3)

UFSAR References

6.5.1
7.3
9.4.2
11.3.2.5

License Renewal Boundary Drawings

LR-GU-3E-822-21-1000
LR-BR-2011 Sheet 2

Table 2.3.2.4 Standby Gas Treatment System (SGTS)
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Damper Housing	Pressure Boundary
Door Seal	Pressure Boundary
Ductwork	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Element	Pressure Boundary
Heater Housing	Pressure Boundary
Piping and fittings	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.2.2.1.3 Standby Gas Treatment System (SGTS)
-Summary of Aging Management Evaluation

2.3.3 AUXILIARY SYSTEMS

The following systems are addressed in this section:

- “C” Battery Room Heating & Ventilation (Section 2.3.3.1)
- 4160V Switchgear Room Ventilation (Section 2.3.3.2)
- 480V Switchgear Room Ventilation (Section 2.3.3.3)
- Battery and MG Set Room Ventilation (Section 2.3.3.4)
- Chlorination System (Section 2.3.3.5)
- Circulating Water System (Section 2.3.3.6)
- Containment Inerting System (Section 2.3.3.7)
- Containment Vacuum Breakers (Section 2.3.3.8)
- Control Rod Drive System (Section 2.3.3.9)
- Control Room HVAC (Section 2.3.3.10)
- Cranes and Hoists (Section 2.3.3.11)
- Drywell Floor and Equipment Drains (Section 2.3.3.12)
- Emergency Diesel Generator and Auxiliary System (Section 2.3.3.13)
- Emergency Service Water System (Section 2.3.3.14)
- Fire Protection System (Section 2.3.3.15)
- Fuel Storage and Handling Equipment (Section 2.3.3.16)
- Hardened Vent System (Section 2.3.3.17)
- Heating & Process Steam System (Section 2.3.3.18)
- Hydrogen & Oxygen Monitoring System (Section 2.3.3.19)
- Instrument (Control) Air System (Section 2.3.3.20)
- Main Fuel Oil Storage & Transfer System (Section 2.3.3.21)
- Miscellaneous Floor and Equipment Drain System (Section 2.3.3.22)
- Nitrogen Supply System (Section 2.3.3.23)
- Noble Metals Monitoring (Section 2.3.3.24)
- Post-Accident Sampling System (Section 2.3.3.25)
- Process Sampling System (Section 2.3.3.26)
- Radiation Monitoring System (Section 2.3.3.27)
- Radwaste Area Heating and Ventilation System (Section 2.3.3.28)
- Reactor Building Closed Cooling Water System (Section 2.3.3.29)
- Reactor Building Floor and Equipment Drains (Section 2.3.3.30)
- Reactor Building Ventilation System (Section 2.3.3.31)
- Reactor Water Cleanup System (Section 2.3.3.32)
- Roof Drains and Overboard Discharge (Section 2.3.3.33)
- Sanitary Waste System (Section 2.3.3.34)
- Service Water System (Section 2.3.3.35)
- Shutdown Cooling System (Section 2.3.3.36)
- Spent Fuel Pool Cooling System (Section 2.3.3.37)
- Standby Liquid Control System (Liquid Poison System) (Section 2.3.3.38)
- Traveling In-Core Probe System (Section 2.3.3.39)
- Turbine Building Closed Cooling Water System (Section 2.3.3.40)
- Water Treatment & Distribution System (Section 2.3.3.41)

2.3.3.1 "C" Battery Room Heating & Ventilation

System Purpose

The "C" Battery Room Ventilation system is a forced air ventilation system designed to maintain the "C" battery room within a specified temperature range and remove hydrogen produced by battery charging. This condition exists when the battery chargers are in operation and hydrogen is being produced by the battery charging function.

The purpose of the "C" Battery Room Ventilation system is to maintain temperatures of the batteries within battery design limits and prevent the buildup of hydrogen within the confines of the "C" Battery Room. The "C" Battery Room Ventilation system accomplishes this purpose by supplying the required air flow through the room necessary to keep the batteries within design temperature limits and remove the hydrogen produced by charging the batteries.

The "C" Battery Room Ventilation system is a non-safety system that is designed to support the 125V DC Station "C" Battery operation.

System Operation

The "C" Battery Room Ventilation system is comprised of air inlet and exhaust louvers, inlet and exhaust ducting, inlet air filter, fan inlet and exhaust duct flexible connections, motor operated isolation dampers, fire dampers, two exhaust fans and fan exhaust gravity dampers. One exhaust fan is normally operating and the other fan is in standby. Also included in the system is a unit heater located in the room for heating during the winter months.

During the summer, outside air is drawn through a louver and filter. The air moves down the ducting passing through a filter and dampers to the ‘C’ Battery Room. The air sweeps through the room and across the equipment removing heat and hydrogen. The air then moves into the room exhaust duct and down the ducting through the dampers, fan and out the louvers. During the winter months, a minimum amount of outside air is drawn in and mixed with air from the 4160V Switchgear Room which flows through the ducting and dampers in the south wall and is exhausted to the outside atmosphere through the exhaust ducting and fans.

For more detailed information, see UFSAR Section 9.4.3.2.

System Boundary

The boundary of the "C" Battery Room ventilation system begins at the intake louvers, encompasses the intake duct, through the inlet filter, up to the entrance into the "C" Battery Room, then out of the room through the room outlet duct, through dampers into the fans and out the outlet louvers. The "C" Battery Room ventilation system also includes an opening in the "C" Battery Room wall to allow air flow from the switchgear room general area. The opening includes a fire damper and an isolation damper. Interior building ducting, inlet, and outlet louvers, fire dampers, motor operated and gravity operated dampers, fans, flexible connections and inline mounted instruments are all within the boundary of the "C" Battery Room ventilation system.

Reason for Scope Determination

The C Battery Room Heating and Ventilation System is not in scope under 10 CFR 54.4(a)(1) because it is not a safety related system relied on to remain functional during and following design basis events. It does meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The C Battery Room Heating and Ventilation System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Fire Protection (10 CFR 50.48), ATWS (10 CFR 50.62), Environmental Qualification (10 CFR 50.49), or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The system provides ventilation and maintains area temperatures within equipment design limits. 10 CFR 54.4(a)(2)

UFSAR References

8.3.2.1
9.4.3.2

License Renewal Boundary Drawings

LR-BR-2009 sheet 1

Table 2.3.3.1 "C" Battery Room Heating & Ventilation
Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Filter
Closure bolting	Mechanical Closure
Damper housing	Pressure Boundary
Door Seal	Pressure Boundary
Ductwork	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Element	Pressure Boundary
Louvers	Pressure Boundary
Piping and fittings	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.1 "C" Battery Room Heating & Ventilation
-Summary of Aging Management Evaluation

2.3.3.2 4160V Switchgear Room Ventilation

System Purpose

The 4160V Switchgear Room Ventilation System is a continuous operating forced air flow system designed to remove the heat produced by the operation of the switchgear, and also to remove smoke in the event of a fire.

The purpose of the 4160V Switchgear Room Ventilation System is to maintain the temperatures in the 1C and 1D switchgear vaults within the design limits of the switchgear, and to remove smoke from the switchgear vaults in the event of a fire. The 4160V Switchgear Room Ventilation System accomplishes this purpose by supplying the required air flow through the vaults necessary to keep the room temperatures within the design limits of the switchgear and to meet the smoke removal requirements of 10 CFR 50.48.

System Operation

The switchgear areas serviced by this ventilation system are located in the Turbine Building within the 1C and 1D switchgear vaults. The ventilation system for each vault is identical and is comprised of a ventilation air intake hood located on the low roof section of the vault and a direct drive power roof ventilator located on the high roof section of the vault.

Each vault roof ventilation penetration is provided with a three hour rated fire damper. The ventilator fan is two speed and equipped with a backdraft damper that automatically closes on loss of fan motive power. The controls and power source for the ventilators are located in a local ventilation control panel that is located directly outside the 4160V 1C switchgear vault. The starters for the ventilators are located within the ventilation control panel. Operation of either roof ventilator is initiated by depressing the high speed or low speed push button on the local control panel. Each ventilator is also provided with a differential pressure switch that is located at the inlet to the ventilator. The purpose of the differential pressure switch is to annunciate a loss of ventilation for the 4160V 1C and 1D vaults. The annunciator is located in the main control room.

The roof ventilators for each 4160V switchgear vault draws ventilation air from the general area containing the non-safety related 4160V switchgear trains 1A and 1B. Air is drawn into the respective vaults via the air intake hood, sweeps across the switchgear and is exhausted back to the train 1A, 1B switchgear area by the associated roof ventilator. The 4160V Switchgear 1C, 1D vaults are located in the Turbine Building and will be addressed with the Turbine Building structure for license renewal scoping. The vaults are not included within the boundary of the 4160V Switchgear Room Ventilation system.

For more detailed information, see UFSAR Section 9.4.3.2.

System Boundary

The 4160V Switchgear Room Ventilation System boundary begins at the air intake hood, encompasses the hood fire damper, moves on to include the roof ventilator fire damper, roof ventilator and backdraft damper. The boundary includes the entire penetration assembly of both the intake hood and the roof ventilator. Not included in the boundary is the 4160V 1C, 1D switchgear vault, which is included in the Turbine Building structure.

Reason for Scope Determination

The 4160V Switchgear Room Ventilation System is not in scope under 10 CFR 54.4(a)(1) because it is not a safety related system that is relied on to remain functional during and following design basis events. It is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The 4160V Switchgear Room Ventilation System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and SBO (10 CFR 50.63). The 4160V Switchgear Room Ventilation System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62) or environmental qualification (10 CFR 50.49).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The system is credited for smoke removal during a fire. 10 CFR 54.4(a)(3)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). The system is credited for heat removal. 10 CFR 54.4(a)(3)

UFSAR References

9.4.3.2

License Renewal Boundary Drawings

LR-BR-2009 sheet 1

Table 2.3.3.2 4160V Switchgear Room Ventilation
Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Filter
Closure bolting	Mechanical Closure
Damper housing	Pressure Boundary
Fan Housing	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.2 4160V Switchgear Room Ventilation
-Summary of Aging Management Evaluation

2.3.3.3 480V Switchgear Room Ventilation

System Purpose

The 480V Switchgear Ventilation system is a continuously operating forced air flow system designed to remove the heat produced by the operation of the 480V switchgear, and to also remove any smoke produced by a fire. The purpose of the system is to provide adequate ventilation to maintain the equipment environment within design temperature limits. The system accomplishes this purpose by utilizing supply and exhaust fans, a recirculation flow path, and associated ducting, dampers and controls.

The system consists of two independent ventilation trains. Train "A" provides ventilation for 480V switchgear room A, and train "B" is for 480v switchgear room B. Train "A" also includes an alternate exhaust fan and associated intake and exhaust dampers.

System Operation

The 480V Switchgear Ventilation system supplies ventilation for each of the two 480 V Switchgear Rooms and uses purge and air recirculation to maintain the Switchgear Room temperature at or below 104°F, with maximum room temperature of 120°F for switchgear operabability. The ventilation system for the "A" Switchgear Room is comprised of two fans (one supply and one exhaust) connected to the "A" Emergency Diesel Generator (EDG). The ventilation system for the "B" Switchgear Room utilizes two fans (one supply and one exhaust) connected to the "B" EDG. In addition, one permanently installed backup ventilation system consisting of one exhaust fan and intake damper is provided in the "A" Switchgear Room. This backup system is connected to the "B" EDG and operates concurrently with the "B" Switchgear Room ventilation system. Filters are provided at the supply air intake.

Each switchgear supply fan draws outside air through a ventilation intake louver, pneumatic damper, and filter, and directs the air to the switchgear room. Air is exhausted from the switchgear room to atmosphere through an exhaust fan and pneumatic damper. A recirculation duct and pneumatic dampers and controls are provided for temperature control. Switchgear room A includes an alternate exhaust fan to provide air flow through alternate intake and exhaust dampers when normal ventilation is lost. No heating or cooling is provided by this system.

Supply and exhaust dampers fail open, recirculation dampers fail closed on loss of the pneumatic control air supply. Ventilation with outside air will therefore remain available upon loss of air.

For more detailed information, see UFSAR Section 9.4.5.2.6.

System Boundary

The 480V Switchgear Ventilation supply system begins at outside air louvers and continues through the supply filters to the supply fans through isolation dampers and discharges to the "A" and "B" Switchgear Rooms. The 480V Switchgear Ventilation exhaust system begins at the exhaust registers in each Switchgear room and continues through isolation dampers and exhaust fans prior to discharge to the outdoor atmosphere. Both the "A" and the "B" Switchgear Ventilation system trains include a recirculation duct between the supply fan suction and the exhaust fan discharge, to allow for operation in a recirculation mode for temperature control.

The "A" Switchgear Room ventilation also includes an alternate path through the alternate air intake damper and alternate exhaust fan. The alternate exhaust fan also discharges to the outdoor atmosphere.

Reason for Scope Determination

The 480V Switchgear Room Ventilation System is in scope under 10 CFR 54.4(a)(1) because it is relied on to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63). This system is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Maintain emergency temperature limits within areas containing safety related components. The 480V Switchgear Room Ventilation System maintains area temperatures within equipment design limits. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

9.4.5.2.6

License Renewal Boundary Drawings

LR-BR-2010 sheet 3

Table 2.3.3.3 480V Switchgear Room Ventilation
Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Filter
Closure bolting	Mechanical Closure
Damper housing	Pressure Boundary
Door Seal	Pressure Boundary
Ductwork	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connection	Pressure Boundary
Louvers	Pressure Boundary
Piping and fittings	Pressure Boundary
Sensor Element	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.3 480V Switchgear Room Ventilation
-Summary of Aging Management Evaluation

2.3.3.4 Battery and MG Set Room Ventilation

System Purpose

The Battery and MG Set Room Ventilation system is a continuously operating forced air flow system designed to remove the heat produced by operating equipment. The system is also designed to remove gasses produced by the A and B station batteries, and to remove any smoke produced by a fire. The purpose of the system is to provide adequate ventilation to maintain the equipment environment within design temperature limits, and to remove any hydrogen released from the batteries. The system is supplemented with an air conditioning unit to provide additional MG Set cooling when required. The system accomplishes this purpose by utilizing supply and exhaust fans, a recirculation flow path, an air conditioning unit and associated ducting, dampers and controls.

System Operation

The system is comprised of an outside air inlet louver, supply filter, one supply fan, one exhaust fan, a bypass duct, dampers and associated controls. The supply system flow splits to supply both the Battery Room and the MG Room, and the exhaust system draws air from both rooms.

As a supplement to the ventilation of the MG Sets, an air conditioner has been provided. Cooled air is directed to the area close to the cooling inlets for each motor. This system is actuated when motor temperature either approaches or exceeds a set motor temperature.

The Battery and MG Set Room Ventilation system supplies ventilation to the A/B Battery Room and the MG Room, using one supply fan and one exhaust fan. The system uses purge and air recirculation to maintain the room temperatures within design limits. Inlet vane control dampers on both fans are normally throttled. If either fan fails, the dampers open wide so that the operating fan can either supply or exhaust the air in the area. The system is manually initiated and is normally in operation.

Battery and MG Set Room Ventilation system supply fan draws outside air through a ventilation intake louver, pneumatic damper, and filter, and directs the air to the Battery Room and the MG Room. Air is exhausted from these rooms to atmosphere through an exhaust fan and pneumatic damper. A recirculation duct and pneumatic dampers and controls are provided for temperature control.

For more detailed information, see UFSAR Section 9.4.5.2.5.

System Boundary

The Battery and MG Set Room Ventilation supply begins at outside air louvers and continues through the inlet dampers and supply filter, through the supply fan, through the supply duct that splits to supply air to the Battery Room and the MG Room. The Battery and MG Set Room Ventilation exhaust begins at the exhaust registers in each room, and continues through the exhaust ducts from each room to a common duct, through the exhaust fan and isolation dampers, and discharges to the outdoor atmosphere. The Battery and MG Set Room Ventilation system includes a recirculation duct between the supply fan suction and the exhaust fan discharge, to allow for operation in a recirculation mode for temperature control.

The supplemental air conditioner does not replace the ventilation system and is not required to support the intended cooling function of the Battery and MG Set Room Ventilation system. This portion of the system is not included within the scope of license renewal.

Reason for Scope Determination

The Battery and MG Set Room Ventilation System is in scope under 10 CFR 54.4(a)(1) because it is relied on to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48) and station blackout (10 CFR 50.63). This system is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for environmental qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Maintain emergency temperature limits within areas containing safety related components. This system maintains the room environment within design limits for equipment operation. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

9.4.5.2.5

License Renewal Boundary Drawings

LR-BR-2010 sheet 5

Table 2.3.3.4 Battery and MG Set Room Ventilation
Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Filter
Closure bolting	Mechanical Closure
Damper housing	Pressure Boundary
Door Seal	Pressure Boundary
Ductwork	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connection	Pressure Boundary
Flow Element (Pitot Tube)	Pressure Boundary
Louvers	Pressure Boundary
Piping and fittings	Pressure Boundary
Sensor Element (Temperature)	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.4 Battery and MG Set Room Ventilation
-Summary of Aging Management Evaluation

2.3.3.5 Chlorination System

System Purpose

The intended function of the Chlorination System (CL2) for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2), dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The CL2 system operates year-round and is designed to inject sodium hypochlorite to various points in the circulating water, service water and emergency service water systems.

The purpose of the system is to eliminate or reduce biofouling while maintaining residual chlorine concentration at the discharge canal within Federal and State regulations.

The system accomplishes the purpose by treatment of systems using bay water as a heat sink in order to minimize micro and macro biofouling of heat exchangers. Biofouling, if left unchecked, will affect performance. It accomplishes this by the chlorine bonding with amines in the marine environment to form toxic chloramine compounds. It will also displace bromine and iodine, both essential marine salts. Marine life, dependent upon a stable balance of chemistry, dies.

System Operation

The Chlorination System (CL2) is comprised of two hypochlorite storage tanks, two eductors and the required piping, valves, instrumentation and controls.

The sodium hypochlorite is stored in two 6500-gallon plastic storage tanks. The system is located within the chlorination building and adjacent pad with the exception of the piping routed below grade and in the Turbine Building. Eductor's are installed in the system that deliver sodium hypochlorite to the main circulating water, service water, and emergency service water headers.

The New Radwaste Service Water (NRWSW) System uses an independent gaseous chlorine system to minimize biofouling (refer to FSAR Section 9.2.1.2). The chlorination equipment utilized for the NRWSW System is included in the NRWSW system and is not included within the boundary of the Chlorination System.

For more detailed information, see UFSAR Section 10.4.5.2.

System Boundary

The license renewal scoping boundary of the Chlorination System (CL2) encompasses that portion of the system that is located in proximity to equipment performing a safety-related function. This includes the portions of the system located within the Turbine Building, and the portions of the system located at the interface between the Service Water and Emergency Service Water systems at the intake structure. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Components that are not required to support the system leakage boundary intended function are not included in the scoping boundary of the CL2.

Not included in the CL2 scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Service Water System
Emergency Service Water System
Circulating Water System

Reason for Scope Determination

The Chlorination System (CL2) is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The CL2 is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The CL2 has potential for spatial interaction with safety related equipment within Turbine Building. 10 CFR 54.4(a)(2)

UFSAR References

10.4.5.2

License Renewal Boundary Drawing

LR-FP-SE-5419
LR-BR-2005 sheet 6
LR-BR-2005 sheet 4

Table 2.3.3.5 Chlorination System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Piping and fittings	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.5 Chlorination System
-Summary of Aging Management Evaluation

2.3.3.6 Circulating Water System

System Purpose

The intended function of the Circulating Water System (CWS) for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, "Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2)", dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The Circulating Water System (CWS) is a low pressure, high volume open cycle cooling water system that is designed to provide cooling water to the Main Condenser and is the main source of cooling water for the Turbine Building Closed Cooling Water (TBCCW) heat exchangers. If TBCCW heat exchanger cooling water is not available from the CWS, the Service Water system provides the cooling water to the TBCCW heat exchangers.

The purpose of the CWS is to remove waste heat released by the power cycle in the Main Condenser and the heat load from the Turbine Building Closed Cooling Water heat exchangers. The CWS accomplishes this purpose by supplying a continuous flow of Barnegat Bay water to the Main Condensers and TBCCW heat exchangers for cooling.

System Operation

The Circulating Water system is comprised of four vertical turbine circulating water pumps, the intake and discharge tunnels, the deicing recirculation line and associated sluice gates, valves and expansion joints, the connections to the Main Condenser and the connections to the Turbine Building Closed Cooling Water heat exchangers. The circulating pump bearings are cooled by water provided to the pumps by a local Fire Protection Water system header.

The CWS pumps are located at the intake structure in separate chambers. The pumps draw sea water from the intake canal and discharge the water into large diameter pipe lines that deliver the cooling water to the intake tunnel. Each pump discharge line is provided with an isolation valve and local pressure instrumentation. From the intake tunnel the water flows into large individual pipes that supply the cooling water to each condenser shell. Each of these cooling water supply lines is provided with an isolation valve and a Chlorination System connection. Heat is absorbed by the cooling water, increasing the water discharge temperature. The heated water is discharged through large lines to the discharge tunnel. Each discharge line is equipped with an isolation valve. The discharge tunnel delivers the water to the discharge canal and the water flows from the canal into Barnegat Bay.

Deicing recirculation is provided during cold weather operation. The deicing recirculation flow is taken from the discharge tunnel and returned to the intake pump structure. A recirculation tunnel provides the heated water which is introduced into the intake structure via sluice gates installed in the tunnel upstream of the trash racks and traveling screens. If sufficient recirculation flow is not available, an alternate portable system is temporarily installed to pump water from the discharge tunnel to the intake structure.

A small percentage of the cooling water supplied to the intake tunnel is diverted to the TBCCW heat exchangers as cooling water. The heated TBCCW heat exchanger water is returned to the discharge tunnel downstream of the condenser discharge connections.

For more detailed information, see UFSAR Section 10.4.5.

System Boundary

The license renewal scoping boundary of the Circulating Water System encompasses that portion of the system that is located in proximity to equipment performing a safety-related function. This includes the portions of the system located within the Turbine Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Components that are not required to support the system's leakage boundary intended function are not included in the scoping boundary of the Circulating Water System.

Not included in the CWS boundary is the Main Condenser tubes which are performing an LR function associated with the Main Condenser system to allow for holdup and plate out of elemental and particulate Iodine. The discharge canal is also not included within the CWS system boundary. The discharge canal is addressed as a structure, identified as Discharge Structure and Canal for license renewal scoping. Not included in the Circulating Water System boundary are the TBCCW heat exchangers and their associated water box vacuum priming system, which is evaluated in the Service Water System scoping evaluation.

The Traveling Screens and Trash Rakes are upstream of the flow path of the Circulating Water System. The Trash Rakes are addressed as part of the Intake Structure for license renewal. The Traveling Screens are part of the Screen Wash system and are therefore addressed with the Screen Wash system for license renewal.

Reason for Scope Determination

The Circulating Water system is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The Circulating Water System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)

UFSAR References

10.4.5

License Renewal Boundary Drawings

LR-BR-2005 sheet 6

Table 2.3.3.6 Circulating Water System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Expansion Joint	Leakage Boundary
Flow Glass	Leakage Boundary
Flow Indicator	Leakage Boundary
Level Glass	Leakage Boundary
Piping and fittings	Leakage Boundary
Strainer Body	Leakage Boundary
Thermowell	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.6 Circulating Water System
-Summary of Aging Management Evaluation

2.3.3.7 Containment Inerting System

System Purpose

The Containment Inerting System (CIS) is a pressurized gas system designed to maintain an inert atmosphere within the Primary Containment to preclude energy releases from a possible hydrogen-oxygen reaction following a postulated Loss-of-Coolant-Accident.

The purpose of the CIS is to provide Primary Containment purging and makeup in order to control the oxygen concentration inside the Primary Containment. To ready the Primary Containment for power operation, the CIS accomplishes the purpose of purging by introducing nitrogen to displace the oxygen from the free volume in the Primary Containment. During power operation, the CIS accomplishes the purpose of makeup by introducing nitrogen to maintain a low oxygen concentration in the Primary Containment. During power operation, when nitrogen makeup is not in service, the nitrogen atmosphere is isolated within the Primary Containment and recirculated by the Drywell Cooling System. Following a Design Basis Accident (DBA) Loss-of-Coolant-Accident (LOCA), the CIS accomplishes the purpose of purging by introducing nitrogen into the Primary Containment to control post LOCA hydrogen and oxygen concentrations to below combustible levels. CIS operation in both the purge and makeup modes is initiated manually.

All remotely operated containment isolation valves in the CIS are automatically closed by the Reactor Protection System upon indications of high drywell pressure or low-low reactor water level.

System Operation

The CIS is comprised of a nitrogen purge header, a nitrogen makeup header, drywell and torus nitrogen purge inlet manual pressure control valves, drywell and torus nitrogen makeup inlet valves, drywell nitrogen relief vent valves, and system flow, pressure, and temperature instrumentation.

The CIS receives vaporized nitrogen through two headers from the Nitrogen Supply System, the Purge Header and the Nitrogen Makeup Header. The Purge Header supplies large volumes of nitrogen to the containment during Primary Containment purging. The Purge Header branches off of the Nitrogen Supply System between the Feedwater Heater layup nitrogen supply line and the pressure reducing station. The Purge Header includes a branch connection for the Hardened Vent System and a portable nitrogen supply connection prior to splitting into separate purge lines for the drywell and the torus. Purge flow to the drywell passes through two drywell nitrogen purge inlet pressure control valves arranged in series and enters the drywell through the Reactor Building Ventilation System drywell purge line. Purge flow to the torus passes through two torus nitrogen purge inlet pressure control valves arranged in series and enters the torus through the reactor building to torus vacuum breaker line. The drywell and torus nitrogen purge inlet pressure control valves are provided with a containment isolation bypass function to allow the operation of these valves for Primary Containment purging post DBA LOCA.

The Makeup Header supplies nitrogen to the Primary Containment for periodic makeup. The Makeup Header is supplied from the Nitrogen Supply System downstream of the electric heater. The Makeup Header includes a branch connection for the nitrogen supply to the

Traversing Incore Probe System, a second branch connection for the nitrogen supply to the drywell nitrogen compressors, and a third branch connection to the Shutdown Cooling Heat Exchanger Room nitrogen addition hose connection prior to splitting into separate makeup lines for the drywell and torus. Makeup flow to the drywell passes through two drywell nitrogen makeup valves arranged in parallel and two drywell nitrogen makeup purge inlet valves arranged in series and enters the drywell through the Reactor Building Ventilation System drywell purge line. Makeup flow to the torus passes through two torus nitrogen makeup valves arranged in parallel and two torus nitrogen makeup inlet valves arranged in series and enters the torus through the reactor building to torus vacuum breaker line.

The CIS also includes the drywell nitrogen relief vent valves and their associated piping connections to the Reactor Building Ventilation System. During Drywell purging operation, when the exhaust is routed through the SGTS, the drywell nitrogen relief vent valves are used to limit the exhaust flow and pressure to the SGTS filters. These valves are also used for venting of the drywell to accommodate pressure increases during normal drywell heatup during startup. This venting is provided through the Reactor Building Ventilation System directly to the stack or through the SGTS prior to release to the stack. The drywell nitrogen relief vent valves are remotely controlled and normally closed except during purge operation.

For more detailed information, see UFSAR Section 6.2.5.

System Boundary

The CIS consists of a Purge Header and a Makeup Header. The Purge Header starts between the Nitrogen Supply System Feedwater Heater layup nitrogen supply line and the pressure reducing station and continues until it splits to provide a purge flowpath to the Drywell and Torus. Each purge flowpath includes two nitrogen purge inlet pressure control valves in series. The drywell purge line terminates at the Reactor Building Ventilation System drywell purge line. The torus purge line terminates at the torus to reactor building vacuum breaker line. Included in the boundary of the CIS Purge Header is the branch connection to the Hardened Vent System up to the normally closed locked Hardened Vent System isolation valve.

The Makeup Header starts downstream of the Nitrogen Supply System electric heater and continues until it splits to provide a makeup flowpath to the Drywell and Torus. Each makeup flowpath includes two nitrogen makeup valves in parallel and then two nitrogen makeup inlet valves in series. The drywell makeup line ties into the CIS drywell purge line downstream of the drywell purge inlet pressure control valves which then terminates at the Reactor Building Ventilation System drywell purge line. The torus makeup line ties into the CIS torus purge line downstream of the torus purge inlet pressure control valves which then terminates at the torus to reactor building vacuum breaker line. Included in the boundary of the CIS Makeup Header is a branch connection to the Shutdown Cooling Heat Exchanger Room nitrogen addition hose connection.

The CIS boundary includes the drywell nitrogen relief vent valves and their associated piping up to the connections to the Reactor Building Ventilation System drywell vent line.

All associated piping, components, and instrumentation contained within the flowpath described above are included in the CIS boundary.

Not included in the CIS license renewal scoping boundary is the Nitrogen Supply System which includes the portable nitrogen supply connection located off of the CIS nitrogen purge header, and, the nitrogen supply to the TIP indexers and the drywell nitrogen compressors located off of the CIS nitrogen makeup header. The Nitrogen Supply System is separately evaluated as its own license renewal system. Also not included in the CIS license renewal scoping boundary are the Hardened Vent System from the normally closed locked Hardened Vent System isolation valve to the Ventilation Stack, the Reactor Building Ventilation System, the Standby Gas Treatment System, the Containment Vacuum Breaker System, and the Instrument (Control) Air System which are separately evaluated as their own license renewal systems.

The CIS supports the primary containment boundary intended function. The CIS nitrogen purge, makeup, and nitrogen relief lines are equipped with air operated containment isolation valves. The limit switches associated with the air operated containment isolation valves are environmentally qualified and support the Environmental Qualification intended function.

The CIS supports the primary containment combustible gas control intended function. This portion of the system includes the Purge Header, the drywell nitrogen purge inlet pressure control valves, and the torus nitrogen purge inlet pressure control valves.

The CIS supports the Fire Protection intended function. This portion of the system is the same as that identified for the combustible gas control intended function described above but also includes the Makeup Header, drywell nitrogen makeup valves, drywell nitrogen makeup purge inlet valves, torus nitrogen makeup valves, and torus nitrogen makeup inlet valves.

Reason for Scope Determination

The Containment Inerting System meets 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The Containment Inerting System is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Containment Inerting System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Environmental Qualification (10 CFR 50.49). The Containment Inerting System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62), or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. The CIS includes Primary Containment isolation valves that close to prevent the release of radioactive contamination through system lines. 10 CFR 54.4(a)(1)
2. Control combustible gas mixtures in the primary containment atmosphere. The CIS is used for post accident combustible gas control of the containment atmosphere. 10 CFR 54.4(a)(1)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The CIS is credited with establishing the inert drywell environment in which a design basis fire cannot occur. The CIS is not required to function during a fire or survive a fire. 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49).

The limit switches associated with the primary containment isolation valves within the CIS are Environmentally Qualified. 10 CFR 54.4(a)(3)

UFSAR References

1.9.21
3.1.37
6.2.5

License Renewal Boundary Drawings

LR-SN-13432.19-1
LR-BR-2011 sheet 2
LR-GU-3E-243-21-1000

Table 2.3.3.7 Containment Inerting System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Drain Trap	Pressure Boundary
Flow Element	Pressure Boundary
Piping and fittings	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.7 Containment Inerting System
-Summary of Aging Management Evaluation

2.3.3.8 Containment Vacuum Breakers

System Purpose

The Containment Vacuum Breaker (CVB) System is two systems designed to prevent torus water from backing up into the drywell during various reactor leakage and suppression condensation modes, and limits negative pressure differentials on the drywell in conjunction with the reactor building to torus vacuum relief system. The reactor building to torus vacuum relief system limits the torus negative pressure relative to reactor building pressure. These systems limit drywell negative pressures relative to the reactor building pressure and permits gas flow only inward from the reactor building to the containment vessel. These systems are the torus to drywell vacuum relief system and the reactor building to torus vacuum relief system.

The purpose of the torus to drywell vacuum relief system is to prevent the drywell pressure from dropping significantly below the pressure in the torus airspace. The reactor building to torus vacuum relief system is intended to prevent the torus air space pressure from dropping significantly below the ambient atmospheric pressure in the reactor building.

The reactor building to torus vacuum breakers accomplish their purpose by opening automatically at a predetermined differential pressure. The torus to drywell vacuum breakers accomplish their purpose by venting non-condensable gas (carryover to the torus during an accident) back to the drywell from the torus.

System Operation

The primary containment is provided with a vacuum breaker system to equalize the pressure between the drywell and the torus, and between the torus and the reactor building. The vacuum breaker system assures that the external design pressure limits of the two chambers are not exceeded. The design bases accident is the complete instantaneous circumferential break of one of the recirculation lines while the reactor is at rated power. The air-steam mixture is vented to the torus. Within the first few seconds, all the air is swept into the torus water space. Because of the high velocity steam within the vents, the air cannot diffuse back into the drywell and it is all effectively forced into the torus water space. After blowdown is complete, only steam is present in the drywell. As the steam condenses on the various surfaces and the drywell spray is activated, the drywell pressure drops. This allows the torus to drywell vacuum breakers to open admitting the gas from the torus air space into the drywell, thus equalizing the pressures.

The torus to drywell vacuum breaker system is comprised of seven vacuum breaker assemblies, each connected between the torus and a drywell vent line, and each of which contains a pair of swing check valves (14 valves total). These valves permit flow from the torus air space into the drywell to torus vent line air space, when pressure differential between the torus and drywell is sufficient to open the check valve. The check valve prevents air from flowing in the opposite direction.

The reactor building to torus vacuum relief system is comprised of a single line that splits into two parallel paths. Each path is equipped with a check valve that permits air flow from the reactor building into the torus, when pressure differential between the reactor building and torus air pressure is sufficient to open the valve. The check valve prevents air from flowing in the opposite direction. Each path is also equipped with an air-operated butterfly valve which provides positive isolation of containment. A differential pressure switch between reactor building and torus opens the air-operated valve automatically.

For more detailed information, see UFSAR Section 6.2.

System Boundary

The boundary of the CVB System starts at the seven torus penetrations for the torus to drywell vacuum relief system then proceeds through check valves and continues to the seven drywell vent line penetrations.

The reactor building to torus vacuum breaker system starts at a vent opening in the reactor building and continues through the containment isolation valves (two parallel check valves followed by two parallel butterfly valves) and return to a penetration on the torus.

All associated piping, components, and instrumentation contained within the flowpath described above are included in the CVB boundary.

Not included in the scoping boundary of the CVB System is the instrument (control) air that is included in the Instrument (Control) Air System scoping boundary. The support portion of the air piping extends from the actuator of the reactor building to torus valves to the associated isolation check valve including the piping to the air accumulator for each butterfly valve. Not included in the CVB System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Primary Containment (includes drywell, suppression chamber, vent pipes, penetrations)
Instrument (Control) Air System
Containment Spray System
Core Spray
Reactor Building Ventilation System
Containment Inerting System

Reason for Scope Determination

The Containment Vacuum Breaker System meets 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events.
The Containment Vacuum Breaker System is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1).
The Containment Vacuum Breaker System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Environmental Qualification (10 CFR 50.49). The Containment Vacuum Breaker System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62), or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. The CVB includes primary containment isolation valves (V-26-15 through V-26-18) that close to prevent the release of radioactive contamination through system lines. 10 CFR 54.4(a)(1)
2. Control combustible gas mixtures in the primary containment atmosphere. The CVB is used for post accident combustible gas control of the containment atmosphere. 10 CFR 54.4(a)(1)
3. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Drywell pressure instrumentation is contained in the Containment Vacuum Breakers system. 10 CFR 54.4(a)(1)
4. Relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
5. Relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)
6. Provide emergency heat removal from primary containment and provide containment pressure control. Provides path to torus for Containment Spray System heat removal. 10 CFR 54.4(a)(1)

UFSAR References

6.2

License Renewal Boundary Drawings

LR-GU-3E-243-21-1000
LR-BR-2004 Sheet 1

Table 2.3.3.8 Containment Vacuum Breakers
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Expansion Joint	Pressure Boundary
Piping and fittings	Pressure Boundary
Valve Body	Pressure Boundary
Valve Body (Vacuum Breakers)	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.8 Containment Vacuum Breakers
-Summary of Aging Management Evaluation

2.3.3.9 Control Rod Drive System

System Purpose

The Control Rod Drive System (CRDS) is a high pressure, low flow system designed to rapidly insert all control rods into the core in response to a manual or automatic signal from the Reactor Protection System (RPS) or to incrementally position control rods in response to signals from the Reactor Manual Control System (RMCS). In addition, the CRDS is designed to supply high pressure, low flow water to the Reactor Head Cooling System. It also serves as an additional source of makeup water to the reactor vessel for level control. The CRDS is not credited in the 10CFR50 Appendix K analysis.

The primary purpose of the CRDS is to rapidly insert negative reactivity to shut down the reactor under accident or transient conditions and to manage reactivity in the reactor core by inserting or withdrawing control rods at a limited rate, one rod at a time for power level control and flux shaping during normal reactor operation. The CRDS accomplishes this by providing water at the required operating pressures to the control rod drives for cooling and for all types of control rod motion in response to inputs from the RMCS & RPS.

The secondary purpose of the CRDS is to supply the Reactor Head Cooling System (RHCS). It accomplishes this by providing water at the required pressure to the reactor vessel head spray nozzle used to cool the upper head region during plant cooldown.

System Operation

The CRDS is comprised of control rod drive mechanisms (CRDMs) and the control rod drive hydraulic system.

Each of the CRDMs is a double acting, mechanically latched, hydraulic cylinder using reactor grade water as the operating fluid. Each CRDM is capable of inserting or withdrawing the attached control rod at a slow, controlled rate as well as providing rapid insertion in an emergency. A locking mechanism allows a drive to be positioned during stroking and will hold the control rod in a fixed position. Each CRDM is an integral unit mounted vertically inside a drive housing, welded to a stub tube, which is welded into a reactor bottom head penetration (evaluated with the Reactor Vessel). The lower end of each drive housing terminates in a flange containing ports for attaching the hydraulic lines from the hydraulic control units (HCUs), and a machined face which mates with a corresponding flange at the lower end of the CRDM drive housing.

The control rod drive hydraulic system is comprised of feed pumps, filters, control valves, piping and associated instrumentation and controllers. In normal operation, one of the two Control Rod Drive (CRD) feed pumps pressurizes condensate water which is then passed through parallel drive water filters. The discharge from the filters supplies the HCUs via the charging header, the drive water header, and the cooling water header, each at a different pressure. The charging header supplies pressurized water to maintain the accumulators charged and ready for service in the event of a scram. Stored energy available from the nitrogen charged accumulators and from reactor pressure provide hydraulic power for rapid simultaneous insertion, or scram, of all control rods. The drive water header provides the CRDMs with motive force for moving the control rods to manage reactivity in the reactor core. The cooling water header provides a constant flow of water to the CRDMs to maximize the life of its internal seals. Minimum flow protection to the feed pumps is provided by a line from the discharge of each pump to the Condensate Storage Tank. A cross connect line between the feed pumps allows the pump not supplying the CRDS to supply the RHCS. A pump test bypass line discharging to the CRD return header to the vessel allows maintenance testing of the feed pumps, and can also supply makeup.

The control rod drive hydraulic system is arranged so that the equipment supporting each CRDM is packaged into modular HCUs, one HCU module to each drive. The HCUs receive signals from the RMCS or RPS and direct water to and from the CRDMs to move the control rods accordingly. Water exhausted from the CRDMs is returned through the HCUs to the exhaust water header and discharged into the CRD return header. Each CRDM has its own separate control and scram devices. Solenoid operated valves on each HCU direct air pressure from the instrument air system scram valve pilot air headers to the inlet and outlet scram valves on each HCU to maintain them in a closed position during normal operation, or to vent them to atmosphere on a scram signal or loss of power.

The HCUs are arranged into a north and south bank, each of which discharges to its own scram discharge volume (SDV). Each SDV consists of a scram discharge volume and an instrument volume with level instrumentation. The SDV receives the reactor water exhausted from all the CRDs during a scram. During normal plant operation and following a scram, the SDVs are drained to the reactor building equipment drain tank.

Excess CRDS flow not required for charging, cooling or drive is discharged directly to the reactor vessel via the CRD return header. This flow path is also utilized to add inventory to the vessel during certain Appendix R, station blackout and abnormal operational transient events.

For additional information, see UFSAR Section 3.9.4.

System Boundary

The CRD system suction side boundary starts at the suction isolation valve which connects to the condensate transfer system. The boundary continues through the CRD feed pumps, the drive water filters, to the HCUs (including the inlet and outlet scram valves) and CRDMs via the charging, drive water and cooling headers and back via the exhaust header, to the CRD nozzle safe end at the reactor vessel. The boundary includes piping downstream of the CRD feed pumps which connects to the Reactor Head Cooling System, and includes the suction piping, discharge piping, minimum flow line to the Condensate Storage Tank (CST) connection, test bypass and stabilizing header lines, HCUs, CRDMs and CRD insert & withdraw lines up to the CRD housing flange. All associated piping, components and instrumentation contained within the flow paths described above are included in the control rod drive system boundary. Also included within the system boundary are the scram discharge volume and instrument volume, their associated piping, instruments, valves, vents and drains.

Also included in the license renewal scoping boundary of the CRD System are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the license renewal boundary drawing for identification of this boundary, shown in red.

Not included in the CRDS boundary are the CRD drive housings, stub tubes and CRD nozzle safe end which are included in the Reactor Pressure Vessel system.

Not included in the CRDS license renewal scoping boundary are the following interfacing systems, which are evaluated as separate license renewal systems:
Control Rods
Alternate Rod Injection (ARI) System
Instrument (Control)Air System
Reactor Head Cooling System
Reactor Building Floor and Equipment Drains
Condensate Transfer System
Reactor Manual Control System
Reactor Pressure Vessel
480V AC System
Reactor Protection System

Reason for Scope Determination

The Control Rod Drive System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), and station blackout (10 CFR 50.63). The CRDS is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62).

System Intended Functions

1. Introduce negative reactivity to achieve or maintain subcritical reactor condition. 10 CFR 54.4(a)(1)
2. Provide reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout. (10 CFR 50.63). 10 CFR 54.4(a)(3)
6. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)

UFSAR References

3.9.4
4.5
4.6
15.8

License Renewal Boundary Drawings

LR-GE-237E487
LR-GE-197E871
LR-BR-2004 Sheet 2
LR-GE-148F712

Table 2.3.3.9 Control Rod Drive System
Components Subject to Aging Management Review

Component Type	Intended Functions
Accumulator	Pressure Boundary
Closure bolting	Mechanical Closure
Filter	Filter
Filter Housing	Pressure Boundary
Flow Element	Pressure Boundary
Gauge Snubber	Pressure Boundary
Gear Box	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Rupture Disks	Pressure Boundary
Strainer	Filter
Strainer Body	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.9 Control Rod Drive System
-Summary of Aging Management Evaluation

2.3.3.10 Control Room HVAC

System Purpose

The Control Room HVAC System serves the Control Room Envelope which consists of the Control Room and Lower Cable Spreading Room. The Computer Room HVAC System is evaluated with the separate Miscellaneous HVAC license renewal system.

The Control Room HVAC system is a ventilation system with emergency operating modes. The system is designed to maintain a habitable environment in the Control Room and to provide ventilation for equipment in the Lower Cable Spreading Room.

The purpose of the Control Room HVAC System is to maintain a comfortable temperature and provide ventilation for personnel and equipment during normal operation. It also incorporates three incident modes of operation to provide a habitable environment for control room operators and equipment cooling after radiological releases associated with design basis accidents, during or after toxic chemical releases and for fires inside the control room. The Control Room HVAC System accomplishes its purpose by providing conditioned air with or without recirculation. The normally operating ventilation system is manually initiated into different incident modes by operator action from a panel in the control room.

Long term cooling is ensured by supplemental ventilation equipment augmenting a Control Room HVAC train when air conditioning is not available.

Plant ventilation systems including the Control Room HVAC are used to control the radioactivity levels in the Control Room areas so as to ensure overall compliance with 10CFR50, Appendix A, GDC 19 "Control Room".

System Operation

The system is comprised of two independent ventilation trains sharing common ductwork. Train A consists of one supply fan and includes steam coils heated by the Heating & Process Steam System, a refrigeration unit with a Turbine Building Closed Cooling Water (TBCCW) cooled condenser and air operated dampers. Train B consists of one supply fan with an electric heating coil for heating and a refrigeration unit with air-cooled condenser. Dampers are motor operated. Temporary ventilation equipment consisting of portable fans, flexible duct and power extension cords are stored adjacent to the Control Room. Additionally, a fan provides exhaust from a kitchenette and toilet rooms. Supply is from the normally operating control room HVAC trains.

Each train draws outside air that is then filtered, conditioned and supplied through a common duct to the Control Room Envelope (Control and Cable Spreading Rooms). A common exhaust duct delivers air back to the HVAC units where it can be discharged to the atmosphere or recirculated. The system has the ability to recirculate air from 0 to 100 percent of rated flow.

Only one system train is operated at any time. Train B is the lead unit to provide the temperature control and air distribution for the control room. Train A serves as a lag or backup to the train B and provides the source of cooling for the control room in the event train B is lost. During normal operation, outside air is mixed with return air, heated or cooled as required, to maintain temperature and ventilation in the control room. When the turbine generator unit is in service, the system operates in the cooling mode. During winter, and if the turbine generator is not in service the system is utilized in the heating mode to maintain inside temperature conditions.

The normally operating system is initiated into incident modes manually. In addition to normal operation, three incident modes of partial recirculation, full recirculation and purge are available. In the event of a design basis accident, manual selection of the partial recirculation mode maintains the Control Room Envelope at a positive pressure with minimal infiltration. During toxic gas releases, the full recirculation mode provides minimal intrusion of toxic gases by using no outside air. In the event of smoke in the Control Room Envelope, purge mode selection supplies all outdoor air to avoid recirculation and clear smoke and fumes. Train B is a fully electric powered unit. Train A air conditioning condenser is normally cooled with TBCCW and heated by the Heating and Process Steam System. Dampers of Train A fail closed upon loss of air. The air dampers can still be manually operated, as required. A single train of refrigeration or a fan in either train with additional cooling provided by temporary equipment will maintain control room temperature.

For more detailed information see UFSAR Section(s) 6.4.1 and 9.4.1.

System Boundary

The Control Room HVAC System boundary begins at the inlet louver of each train and passes through an inlet damper, an air filter, cooling and heating coils, a supply fan and an isolation damper. Air is then ducted and joined by the redundant train and supplied to the Control Room Envelope which includes the Control Room Panel Area, the shift supervisors office, the Lower Cable Spreading Room and the kitchen and toilet area of the control room. Included within the boundary are the fire dampers at the penetrations into the Control Room Envelope. A common return duct which begins at the Lower Cable Spreading Room draws exhaust air from the Control Room Area through an isolation damper and ends at the exhaust air louver and recirculation air plenum of each air handling unit.

A separate fan exhausts air from the control room kitchen and toilet rooms. The boundary begins at the exhaust register of each room and continues through the exhaust duct, exhaust fan and backdraft damper prior to ending at the discharge to the atmosphere. In addition, there is control room temporary ventilation equipment consisting of portable fans, flexible duct and power extension cords.

All associated ductwork, components and instrumentation contained within the flow paths and systems described above are included in the Control Room HVAC System boundary. Not included in the scoping boundary of the Control Room HVAC System is the HVAC Train A heating coil and piping which is evaluated with the Heating and Process Steam System for license renewal scoping. Also not included is the Train A condensing coil which is evaluated with the Turbine Building Closed Cooling Water System for license renewal scoping.

The refrigeration equipment of Train A is not credited to support the cooling intended function which is supplemented by temporary ventilation. The kitchen and toilet room exhaust fan and inlet louver are not required to support intended functions as the fans backdraft damper maintains Control Room Envelope. These portions of the Control Room HVAC System are not included within the scope for license renewal.

The ventilation equipment of both HVAC trains along with the refrigeration unit of Train B and temporary ventilation perform the intended functions and are included in the scope of license renewal.

Reason for Scope Determination

The Control Room HVAC System is in scope under 10 CFR 54.4(a)(1) because it is relied on to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and SBO (10 CFR 50.63). The Control Room HVAC System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Provide centralized area for control and monitoring of nuclear safety related equipment. The Control Room HVAC system provides habitability of the control room. 10 CFR 54.4(a)(1)
2. Maintain emergency temperature limits within areas containing safety related components. Single train of refrigeration or a Train A or B fan with additional cooling provided by temporary equipment will maintain Control Room temperature. 10 CFR 54.4(a)(1)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). Purges smoke from control room. 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). The Control Room HVAC system provides habitability of the control room. 10 CFR 54.4(a)(3)

UFSAR References

9.4.1
6.4.1
12.3.3

License Renewal Boundary Drawings

LR-BR-2010 sheet 4

Table 2.3.3.10 Control Room HVAC
Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Filter
Closure bolting	Mechanical Closure
Damper housing	Pressure Boundary
Door Seal	Pressure Boundary
Ductwork	Pressure Boundary
Fan Housing	Pressure Boundary
Filter Housing	Pressure Boundary
Flexible Connection	Pressure Boundary
Heat Exchangers (Condensing Coil)	Heat Transfer
	Pressure Boundary
Heat Exchangers (Evaporator Coil)	Heat Transfer
	Pressure Boundary
Heater Housing	Pressure Boundary
Louvers	Pressure Boundary
Piping and fittings	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.10 Control Room HVAC
-Summary of Aging Management Evaluation

2.3.3.11 Cranes and Hoists

System Purpose

The Cranes and Hoists system is comprised of load handling overhead bridge cranes, monorails, jib cranes, and hoists provided throughout the facility to support operation and maintenance activities. The system includes cranes and hoists required to comply with the requirements of NUREG-0612, Control of Heavy Loads, and hoists for handling light load. Major cranes include the reactor building crane, and the turbine building crane.

The reactor building crane services the operating floor and is used to lift all heavy loads required to travel over the spent fuel pool. The crane is also used to handle new fuel and transport the spent fuel cask. The crane has been upgraded to a single failure proof criteria in accordance with NUREG-0612 and NUREG-0554. The turbine building crane is used to handle heavy loads in the Turbine Building, primarily to support turbine repairs or maintenance. Cranes and hoists are classified non-safety related, designed to Seismic Class II criteria.

The purpose of Cranes and Hoist is to safely move material and equipment as required to support operations and maintenance activities.

Included in the evaluation boundary of Cranes and Hoists system are load handling systems in various areas of the facility. Cranes and hoists in scope of NUREG-0612 are in scope of license renewal. Other cranes and hoists that are not in scope of NUREG-0612 but travel in the vicinity of safety related systems, structures, and components (SSCs) are also in scope of license renewal; if it is determined that their failure will impact a safety related function. As a result the reactor building (RB) crane, the turbine building crane, turbine building heater bay crane, recirculation pumps monorail, spent fuel pool jib cranes, containment vacuum breakers jib cranes/hoists, equipment handling monorail (RB El. 95'), and the torus bay monorail are in scope of license renewal. The boundary for Cranes and Hoists is limited to load bearing structural components such as, the bridge, the trolley, rails and rail fasteners, monorail beams, and jib crane structural members.

Cranes and Hoists that are determined not to be in scope of license renewal include New Radwaste Building overhead crane, Maintenance Building overhead crane, Low Level Radwaste Storage Facility cranes, machine shop overhead crane, storage building crane, Reactor Building railroad airlock hoist, control rod drive rebuild area jib cranes and hoist, drywell airlock monorails, Chlorination Facility hoist, and Ventilation Stack hoist. Failure of these cranes and hoists will not impact a safety related function.

Not included in the evaluation boundary of Cranes and Hoists is the reactor refueling platform, overhead crane structural support steel and crane runway girders. The refueling platform is separately evaluated with Fuel Storage and Handling license renewal system. The structural support steel and runway girders are included with the license renewal structure serviced by the crane.

For more detailed information, refer to UFSAR Section 9.1.4.2.3

System Operation

Not Required

System Boundary

Not Required

Reason for Scope Determination

Cranes and Hoists meet the scoping requirements of 10 CFR 54.4(a)(1) because the reactor building crane a safety-related structure which is relied upon to remain functional during and following design basis events.

Cranes and Hoists meet 10 CFR 54.4(a)(2) because failure of the non-safety related structure could prevent satisfactory accomplishment of functions(s) identified for 10 CFR 54.4(a)(1).

Cranes and Hoists are also not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide physical support for safety related systems, structures, and components (SSCs). The reactor building crane is used to transport the spent fuel cask over irradiated fuel. 10 CFR 54.4(a)(1)
2. Provide a safe means for handling safety related components and loads above or near safety related components. 10 CFR 54.4(a)(2)

UFSAR References

9.1.4.2.3

License Renewal Boundary Drawings

Not Required

Table 2.3.3.11 Cranes and Hoists
Components Subject to Aging Management Review

Component Type	Intended Functions
Crane (Bridge; Trolley)	Structural Support
Crane (Bridge; Trolley; Girders)	Structural Support
Jib Cranes (Columns; Beams; Anchorage)	Structural Support
Monorails, and Hoists (Beams; Plates)	Structural Support
Rail System (Rail, Plates, Clips)	Structural Support
Structural Bolts	Structural Support

The aging management review results for these components are provided in
Table 3.3.2.1.11 Cranes and Hoists
-Summary of Aging Management Evaluation

2.3.3.12 Drywell Floor and Equipment Drains

System Purpose

Drywell Floor and Equipment Drains (DFED) are comprised of both gravity and pumped fluid lines designed for the collection of drainage from floor drains and equipment drains located in the drywell structure, and subsequent transfer of the drainage to the Radwaste System. They also include that portion of the reactor coolant pressure boundary leak detection function comprised of the instrumentation monitoring the drywell floor drain sump fill time and pump flow rates from the Drywell Floor Drain Sump and Drywell Equipment Drain Tank.

The purpose of the DFED is to provide for collection of floor drains and equipment drains located inside the drywell structure, and to transfer the collected drainage to the Radwaste System for processing. The DFED accomplish this purpose by collecting floor drainage and condensed steam from the drywell air coolers in the Drywell Floor Drain Sump, and equipment drainage in the Drywell Equipment Drain Tank, and using submersible pumps from the sump and duplex pumps from the drain tank to transfer the collected drainage to Radwaste System collection tanks for processing.

System Operation

The DFED are comprised of drain lines that begin at various floor drains and equipment drain funnels located throughout the drywell. Floor drain lines and condensate drains from the Drywell air coolers are routed to the Drywell Floor Drain Sump. The sump fill time is monitored by the unidentified drywell leak rate recorder, which alarms if sump fill rate exceeds a predetermined value. Two submersible pumps transfer the sump contents to either the Floor Drain Collector Tank or the Chemical Waste Floor Drain Collector Tank, both of which are part of the Radwaste System. Floor drain sump pumpout is monitored by a timer which measures time between successive pump operations and alarms on abnormal operation. The flowrate of pumped discharge from the sump is monitored as part of the leak detection function. The equipment drain lines are routed to the Drywell Equipment Drain Tank. Duplex pumps route the drainage through the Drywell Equipment Drain Tank Heat Exchanger as necessary and transfer the leakage to either of the high purity waste collection tanks in the Radwaste System. The flowrate of pumped discharge from the equipment drain tank is monitored as part of the leakage monitoring system. The portions of the pumped discharge lines from both the Drywell Floor Drain Sump and from the Drywell Equipment Drain Tank that penetrate the drywell are primary containment boundaries and include dual containment isolation valves. The Reactor Protection System closes these valves on high drywell pressure or low-low reactor level. The submersible and duplex pumps from the floor drain sump and the equipment drain tank are level switch controlled and actuate automatically. The pumps are interlocked to shut down on closure of the isolation valves.

Both identified and unidentified leakage is collected by the DFED system. The Drywell Floor Drain Sump receives both liquid drainage from the floor drains and steam leakage which is condensed by the drywell air coolers, consequently it is the primary sump used to measure both steam and liquid reactor coolant leaks. Until confirmation of leakage sources is made, all leakage into the Drywell Floor Drain Sump is considered unidentified leakage. Increase in flow to the Drywell Equipment Drain Tank is due to increased seal and gland leakages only, which by definition is identified leakage. Reactor Recirculation Pump seal failure is detected in this manner. The only sources of leakage inside the drywell are from either the primary system, or the Reactor Building Closed Cooling Water System.

For more detailed information, see UFSAR sections 5.2.5, 9.3.3, and 11.2.2.

System Boundary

The boundary of the DFED begins with the individual floor drains, drywell air coolers condensate drains, and equipment drains located in the drywell, and continues through gravity lines to the drywell floor drain sump and drywell equipment drain tank. At both the floor drain sump and the equipment drain tank, pumps discharge the drainage through pressure piping, with the system boundary ending at the attachment points on the various Radwaste System collection tanks. Included in this boundary are the containment isolation valves, and other various valves and fittings required for maintaining the system leakage boundary, along with the instrumentation described above as comprising part of the reactor coolant pressure boundary leak detection function.

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

Not included in the scope of license renewal are portions of the DFED that are encased in concrete, as leakage in this environment does not have the potential for spatial interaction. Not included are the Drywell Equipment Drain Tank level switches and Drywell Floor Drain Sump level switches, as these are not considered leakage boundary components.

Not included in the DFED boundary are the following systems, which are separately evaluated as license renewal systems:
Radwaste System
Reactor Protection System
Reactor Building Closed Cooling Water System
Drywell Cooling System

Reason for Scope Determination

The Drywell Floor and Equipment Drains meet 10 CFR 54.4(a)(1) because portions of the system are safety related and are relied on to remain functional during and following design basis events. They meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). They also meet 10 CFR 54.4(a)(3) because they are relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for environmental qualification (10 CFR 50.49). The Drywell Floor and Equipment Drains are not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for fire protection (10 CFR 50.48), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. 10 CFR 54.4(a)(1)
2. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The Drywell Floor and Equipment Drains system has potential for spatial interaction with safety-related equipment within the drywell, reactor building, and exhaust tunnel. 10 CFR 54.4(a)(2)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49) The limit switches associated with the DFED containment isolation valves are environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

5.2.5
9.3.3
11.2

License Renewal Boundary Drawings

LR-JC-147434 sheet 2
LR-JC-147434 sheet 3
LR-GE-237E798 sheet 1
LR-BR-2002 Sheet 1
LR-GE-107C5339
LR-GE-148F444
LR-GE-237E756

Table 2.3.3.12 <u>Drywell Floor and Equipment Drains</u>
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Flow Element	Leakage Boundary
Flow Glass	Leakage Boundary
Heat Exchanger (DWEDT)	Leakage Boundary
	Structural Support
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (DWEDT pumps)	Leakage Boundary
Tanks (DWEDT)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.12 Drywell Floor and Equipment Drains
-Summary of Aging Management Evaluation

2.3.3.13 Emergency Diesel Generator and Auxiliary System

System Purpose

The Emergency Diesel Generator (EDG) and Auxiliary System is a pair of stand alone, diesel engine driven electrical power plants, designed to provide a source of onsite power to the plant AC electrical systems in the event of a design basis accident or loss of offsite power.

The purpose of the EDG and Auxiliary System is to independently provide sufficient power to energize all equipment required for safely shutting down the reactor. It accomplishes this using two diesel generator units located in separate rooms of a stand alone, reinforced concrete structure. Each diesel engine powers a generator at a voltage compatible to the plant electrical distribution systems with sufficient output capacity to meet plant shutdown loads. Each diesel generator is equipped with its own starting system, cooling system, lubrication system, combustion air and equipment cooling system, a fuel oil storage and transfer system and all the auxiliaries that allow it to perform its function.

System Operation

The Emergency Diesel Generator (EDG) and Auxiliary System is comprised of two diesel driven generators and associated auxiliary equipment. Each unit with its auxiliaries is located in separate rooms within the Diesel Generator Building. A tank vault contains the common fuel oil tank. Included in the diesel assembly are directly attached piping, valves, starters, fans, filters, turbochargers, radiators, speed governor, instrumentation and other equipment. The diesels are automatically started by a reactor low-low level, a high drywell pressure signal, by an undervoltage condition in the 4160V AC System or by a low diesel generator lube oil temperature. The diesels can be remote manually started from the Control Room or at the local EDG switchgear panels.

The EDG starting system for each diesel consists of electric starting motors powered by 56-cell batteries. Battery chargers keep the battery cells charged. The battery compartments are fan ventilated.

The EDG cooling water system for each diesel consists of engine driven cylinder bank pumps that supply cooling to the engine. Heated water from the discharge manifold flows through two forced air cooled radiators through a lube oil cooler and back again to the pumps. During shutdown, an immersion heater maintains coolant temperature. Water circulates by siphon action through the lube oil cooler, which then functions as a lube oil warmer. The system includes a temperature control manifold, water tank, piping and instrumentation.

The EDG lubrication system for each diesel provides automatic lubrication and warming of the diesel and its subcomponents. It consists of three shaft driven and three auxiliary motor driven pumps, piping, valves, filters, strainers and instrumentation. When the engine is operating, three lube oil pumps circulate oil for lubrication and cooling of engine components and the turbocharger. The lubrication system operates continuously to maintain the diesels in a standby condition. Lube oil warmed by the cooling system is circulated through the engine and turbocharger. The engine speed governor contains a separate oil piping circuit for the governor hydraulics.

The EDG combustion air intake cooling system for each diesel supplies filtered air for engine combustion and also for generator, engine and electrical component cooling. Combustion exhaust powers the turbocharger and passes through a silencer before discharge through an engine exhaust stack. The ventilation exhaust of each generator housing circulates over the engine prior to discharge from the diesel compartment. They consist of fans, filters and plenums.

The EDG fuel oil storage and transfer system consists of a common diesel generator fuel oil tank and two fuel transfer pumps, a fuel pump and a single day tank per diesel. It also includes filters, piping, valves and instrumentation. Automatic transfer from the diesel generator fuel oil tank by the transfer pumps maintains day tank level. An engine mounted fuel pump then draws fuel from the day tank and delivers it to the engine. Makeup to the diesel generator fuel oil tank is from the plant fuel oil storage tank (evaluated with the Main Fuel Oil Storage and Transfer System). An alternate connection allows fuel oil to be supplied directly from the plant fuel oil storage tank to each day tank. A tanker truck connection located outside the EDG building also utilizes the alternate fuel oil path to the day tanks. A fuel oil waste tank located outside the structure receives waste oil and water from the EDG fuel oil tank vault sump pump.

For additional detail, see UFSAR sections 8.3 and 9.5.4 through 9.5.9.

<u>System Boundary</u>

The EDG and Auxiliary system boundary includes directly attached piping, valves, manifolds, starters, turbochargers, internal coolers, instrumentation, and other equipment. Included in the EDG license renewal scoping boundary for evaluation is the EDG starting system. The EDG starting system consists of batteries, starter motors, cable, battery chargers and the relays to start the diesels. These items are considered electrical commodities. The EDG cooling water system boundary begins at the EDG cooling water discharge manifold and continues through forced air-cooled radiators, oil coolers and individual engine bank water pumps where it is returned to the EDGs. Included is the water tank, temperature control valve, immersion heater and drain valves for each EDG. The EDG lubrication system boundary for each EDG begins with the engine sump, continues through strainers, pumps, filters, and valves for the main lube, piston cooling, oil cooler and turbocharger pumping circuits. Also included is the oil pumping circuit for the engine speed governor hydraulics. The EDG combustion air intake and exhaust system boundary begins with the air intake hood, continues through the inertial dust bin air filter and enters the engine compartment. Combustion air is drawn through an oil bath air filter and into the turbocharger compressor. Combustion gases pass through the turbocharger and are discharged through a silencer and out the engine exhaust stack through the roof. Also included are two shaft driven fans for equipment and radiator cooling and the battery compartment ventilation fans. The EDG fuel oil storage and transfer system begins at the diesel generator fuel oil tank. A tank discharge line then splits and continues through each diesel's dual fuel transfer pumps and to the day tank of each diesel. A supply line from each day tank then ends at its connection to the engine mounted fuel pump. Included is the connections from the plant fuel oil storage tank to the diesel generator fuel oil tank discharge lines and fill line. All associated piping, components and instrumentation contained within the flow paths and systems described above are included in the emergency diesel generator system boundary. Not included in the scoping boundary of the Emergency Diesel Generator and Auxiliary System is the piping of the plant fuel oil storage tank which is evaluated with the Main Fuel Oil Storage and Transfer System for license renewal scoping.

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

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

Reason for Scope Determination

The Emergency Diesel Generator and Auxiliary System is in scope under 10 CFR 54.4(a)(1) because it is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and SBO (10 CFR 50.63). The Emergency Diesel Generator and Auxiliary System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Provide motive power to safety related components. Each diesel generator can independently provide sufficient power to energize all equipment required for safely shutting down the reactor. 10 CFR 54.4(a)(1)
2. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The EDG System has the potential for spatial interaction with safety related equipment within the Emergency Diesel Generator Building. 10 CFR 54.4(a)(2)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The diesels provide an alternate power supply to offsite power. 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). Credited as the source of onsite power during SBO recovery. 10 CFR 54.4(a)(3)

UFSAR References

8.3.1.1.5
9.5.4
9.5.5
9.5.6
9.5.7
9.5.8
9.5.9

License Renewal Boundary Drawings

LR-BR-3000
LR-GU-3E-861-21-1000
LR-GU-3E-861-21-1001
LR-GU-3E-861-21-1002
LR-GU-3E-862-21-1000

Table 2.3.3.13 Emergency Diesel Generator and Auxiliary System Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Filter
Closure bolting	Mechanical Closure
Ductwork	Pressure Boundary
Exhaust Stack	Pressure Boundary
Fan Housing (Dust Bin Blower Fan)	Pressure Boundary
Fan Housing (Radiator Fan)	Pressure Boundary
Filter (Inertial Air Bin)	Filter
Filter (Oil Bath)	Filter
Filter Housing (Air Cooling)	Pressure Boundary
Filter Housing (Fuel Oil)	Pressure Boundary
Filter Housing (Lube Oil)	Pressure Boundary
Flame Arrestor (Fuel Oil Tank)	Filter
	Fire Barrier
Flexible Hose	Pressure Boundary
Heat Exchanger (Lube Oil Cooler)	Heat Transfer
	Pressure Boundary
Heat Exchangers (Radiator)	Heat Transfer
	Pressure Boundary
Louvers	Direct Flow
Muffler	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (Fuel Oil)	Pressure Boundary
Pump Casing (Lube Oil)	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Sensor Element (Lube Oil)	Pressure Boundary
Sensor Element (Temperature Control Manifold)	Pressure Boundary
Sight Glasses	Pressure Boundary
Strainer	Filter
Strainer Body	Pressure Boundary
Tanks (Fuel Day Tank)	Pressure Boundary
Tanks (Fuel Oil Tank)	Pressure Boundary
Tanks (Immersion Heater)	Pressure Boundary
Tanks (Water Tank)	Pressure Boundary
Temperature Control Manifold (Water Cooling)	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System
-Summary of Aging Management Evaluation

2.3.3.14 Emergency Service Water System

System Purpose

The Emergency Service Water (ESW) is a standby system designed to supply cooling water from the Ultimate Heat Sink (UHS) to the tube side of the containment spray heat exchangers. The ESW system, along with the Containment Spray System, comprise the Containment Heat Removal Systems.

The purpose of this system is to aid the Containment Spray System in removing fission product decay heat from the primary containment following a design basis LOCA. This system is also used during normal operation to cool the torus when necessary. It accomplishes this by supplying cooling water, from the UHS (Intake Canal), to the Containment Spray heat exchangers and transferring the heat energy to the environment via the discharge canal.

System Operation

ESW is comprised of two independent loops, each with two pumps that supply cooling water to one containment spray loop, which contains two heat exchangers. The four ESW pumps and piping supply cooling water from the Intake Canal (UHS) to the containment heat exchangers, its only load, and discharges the heated water to the Discharge Canal. The ESW pumps are controlled manually from switches located in the Control Room. All of the valves in the ESW system are either manually operated or check valves. There are no MOVs in the system. The ESW pumps can be manually operated at any time except when diesel-generator load sequencing is in progress. A backup interlock is provided to prevent pump start if diesel-generator load sequencing is in progress.

During normal plant operations, when ESW is in standby, the Service Water System (SWS) supplies a constant flow of water through the containment spray heat exchangers to maintain them full of chlorinated water. Sodium hypochlorite is injected into the ESW system via the SWS Keep Fill Line. Additionally, ESW can be cross-connected with the SWS, which allows ESW to provide an alternate cooling path during plant shutdown and during SWS maintenance.

A single restrictive orifice downstream of ESW Overboard Discharge isolation valves is designed to prevent containment heat exchangers tube leakage of radioactive contamination from containment to the environment by maintaining adequate backpressure to keep ESW (tube side) pressure higher that the Containment Spray (shell side) pressure.

For more detailed information, see UFSAR Section 6.2.2.

System Boundary

The system boundary of ESW starts with each pump and continues through to the connection between the ESW and the Overboard Discharge lines. Included in this boundary is the tube side of the Containment Spray Heat Exchangers, all safety related vent/drain lines and valves, safety related instrumentation and the Service Water System supply line up to and including the SWS to containment spray heat exchanger valves.

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

Not included in the ESW license renewal scoping boundary is the shell side of the Containment Spray Heat Exchangers, which will be scoped separately as part of the Containment Spray System.

Not included in the ESW license renewal scoping boundary is the SWS piping upstream of the SWS to the containment spray heat exchanger valves, including the Chlorination System interface, which will be scoped separately as part of the Service Water System.

Not included in the ESW license renewal scoping boundary is the 30" Overboard Discharge line and the Roof Drains line off of ESW Loop I, downstream of restrictive orifice RO-21A, which will be scoped separately as part of the Roof Drain & Overboard Discharge System.

Reason for Scope Determination

The Emergency Service Water system meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety-related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49).
The Emergency Service Water System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide heat removal from safety related heat exchangers. Provides a water supply to remove heat from the Containment Spray System and reject it to the Ultimate Heat Sink via the Discharge Canal. 10 CFR 54.4(a)(1).
2. Provide secondary containment boundary. Ensures ESW is at a higher pressure than the Containment Spray System to prevent leakage form the Containment to the Ultimate Heat Sink. 10 CFR 54.4(a)(1)
3. Provide emergency heat removal from primary containment and provide containment pressure control. Provides a water supply to remove the heat from the Containment Spray System and reject it to the Ultimate Heat Sink via the Discharge Canal. 10 CFR 54.4(a)(1).
4. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

UFSAR References

6.2.2
7.3.1
9.2.1

License Renewal Boundary Drawings

LR-BR-2005 sheet 2
LR-BR-2005 sheet 4

Table 2.3.3.14 Emergency Service Water System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Expansion Joint	Pressure Boundary
Flow Element	Pressure Boundary
Heat Exchangers (Containment Spray)	Heat Transfer
	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (ESW Pumps)	Pressure Boundary
Pump Casing (HTXR Drain Pumps)	Leakage Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Sight Glasses	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.14 Emergency Service Water System
-Summary of Aging Management Evaluation

2.3.3.15 Fire Protection System

System Purpose

The Fire Protection System is a normally operating mechanical system, designed to provide for the rapid detection and suppression of a fire at the plant. Some portions of the Fire Protection System are not required to perform intended functions and are not in scope.

The Fire Protection System consists of the fire protection water system, carbon dioxide gas systems, Halon systems, portable foam equipment, portable fire extinguishers, and fire detection and signaling systems. These systems work in conjunction with physical plant design features to provide overall fire protection for Oyster Creek. The physical plant design features consist of fire barrier walls and slabs, fire barrier penetration seals, fire doors, fire rated enclosures (including steel fire wrap), and dikes credited for containing oil spills.

The purpose of the Fire Protection System is to promptly detect, contain, and extinguish fires if they occur, maintain the capability to safely shutdown the plant if fires occur, and prevent the release of a significant amount of radiation in the event of a fire. The Fire Protection System accomplishes this by providing fire protection in the form of detection, alarms, fire barriers, and suppression for selected areas of the plant.

System Operation

The fire protection water system is supplied by two diesel driven fire pumps, each taking suction from a pond formed by a small dam on the Oyster Creek. The two fire pumps are housed in a common fresh water pumphouse adjacent to the pond. Each fire pump diesel engine has its own fuel supply located adjacent to the pumphouse. Two electric motor driven pond pumps normally provide pressure to the fire protection system, with the diesel fire pumps maintained in standby operation.

Fire water system pressure is normally maintained by the two electric pond pumps. The diesel driven fire pumps are arranged to start automatically if the pressure drops due to a large water demand. The pumps can be manually started from the Control Room or at the pump house.

To satisfy redundancy requirements, a Fire Protection Water Tank with an electric motor driven fire pump is also provided as a backup supply. This backup fire pump is located in the redundant fire protection pumphouse. The redundant motor driven electric fire pump and its associated tank constitute an emergency supply when the primary water supply is not available. The redundant fire pump can only be started manually, either at the redundant fire protection pumphouse or from the Control Room. This water source is normally isolated from the yard loop.

The supply lines from both the normal and redundant fire water sources connect with an underground loop which encircles the plant and provides fire protection water to yard fire hydrants, fixed pipe water suppression systems and fire hose stations. Sectionalizing valves of the post indicator type are provided on the loop to allow isolation of the various sections for maintenance. The piping system is arranged to prevent loss of both primary and backup fire suppression capability from a single failure.

Suppression systems include automatic wet pipe sprinkler and deluge systems, manually actuated preaction sprinkler systems, and an automatic preaction sprinkler system. Hose stations have been provided within plant buildings, and are located so that all areas containing or exposing safety related systems can be reached with a fire hose not over 100 feet in length.

In addition to supplying water for fire protection, the fire protection water system normally provides seal water to the dilution pumps, the circulating water pumps and the new radwaste service water pumps. The system also provides a source of backup water to the Core Spray System, to the Condensate Storage Tank and to the Isolation Condensers, and backup cooling to the main plant air compressors.

A total flooding carbon dioxide system protects the safety related 4160 volt switchgear area and is manually actuated. The turbine generator exciter and turbine bearings are protected by high-pressure carbon dioxide systems, and are automatically actuated by thermal heat detectors.

The Halon systems protect the 480 Volt Switchgear Rooms A and B, the Electric Tray Room, the A/B Battery Room, and critical panels in the Control Room. Automatic actuation is provided in each area.

The carbon dioxide and halon systems are normally aligned to their respective gas supplies, and are actuated either automatically and/or manually upon detection of a fire.

Portable aqueous film forming foam equipment is provided in the vicinity of the Diesel Generator Building, located in hose houses.

Dry chemical, carbon dioxide and pressurized water fire extinguishers have been distributed throughout the plant in accordance with NFPA guidelines. In addition, a manual dry chemical system utilizing wheeled portable extinguishers has been provided for the turbine operating floor. Portable fire extinguishers are provided in the drywell when the drywell is open for maintenance. Extinguishers are also provided in other areas of the Reactor Building, and at the Circulating Water intake area. Portable extinguishers are provided for the Control Room.

Fire detection and signaling systems provide a means of detecting the presence of a fire, and initiate an alarm in the Main Control Room or Security Guard House, or automatically initiate the appropriate fire protection system. Fire detection and signaling systems utilize three types of detection systems: products of combustion (ionization and photo electric), thermal (fixed rate of rise and rate compensated/fixed temperature) and flow switches. For areas that are vital, the alarms are fed to a local alarm panel and then to the Fire Alarm Master Panel in the Control Room. Non-vital systems alarm in the Security Guard House. Flow switches or pressure switches are used as the means of detection in wet pipe sprinkler systems. For wet pipe sprinkler systems with flow alarm valves, a pressure switch is the means of detecting a fire. The wet pipe sprinkler systems have fusible heads. The fire detection and signaling system include fire detectors for selected safety related areas. Smoke detectors are provided in the ventilation systems of the Control Room and the A/B Battery Room. Actuation of automatic suppression systems transmits an alarm on the signaling system to the Control Room. A unique fire alarm signal is provided in the Control Room.

For more detailed information, see UFSAR Section 9.5.1.

System Boundary

The boundary of the fire protection water system begins with the two diesel driven fire pumps and two electric motor driven pond pumps located at the fresh water pumphouse. The discharge from the four pumps ties into a common header that continues to a connection with the main fire protection water loop, which terminates at the suppression systems, hydrants, hose stations or connections with other systems. A connection off the common header supplies seal water to the circulating water pumps, dilution pumps and radwaste service water pumps. The main loop continues around the perimeter of the power block, and includes numerous branch lines that supply various sprinkler systems, hose stations and fire hydrants. The main fire protection water loop also includes a branch connection to each of the two Core Spray System trains, a branch connection to the Condensate Transfer System, a branch connection to the Isolation Condenser makeup, and a branch connection for backup cooling to the Instrument Air compressors. Sectionalizing post indicator type valves are provided on the main loop to allow isolation of the various sections for maintenance.

The main loop also includes a connection from the redundant fire protection water supply. The redundant supply begins at the fire protection water storage tank, and continues through the redundant motor driven fire pump through a normally closed valve to the connection with the main fire protection water loop.

The diesel driven fire pumps diesel engines have independent fuel supplies that begins at each of the two Fire Diesel Fuel Oil tanks, and continues through the fuel supply piping to each diesel engine.

The boundary for the total flooding carbon dioxide suppression system protecting the C and D 4160V switchgear area begins at the carbon dioxide storage tank, and continues through the normally closed master control valve to the spray nozzles in the C and D 4160V switchgear area. The boundary for the turbine exciter and turbine bearing carbon dioxide suppression systems begin at the carbon dioxide storage cylinders, and continues through the normally closed discharge control valves to the spray nozzles at the turbine exciter and turbine bearing.

The boundary for the Halon suppression systems that protect the 480 Volt Switchgear Rooms A and B, the A/B Battery Room and Electric Tray Room, and critical panels in the Control Room begin at the Halon storage cylinders, and continues through the normally closed discharge control valves to the spray nozzles in the previously mentioned rooms.

Portable aqueous film forming foam equipment and portable fire extinguishers are included in the boundary of this licensed renewal system scoping evaluation, however a flowpath description is not applicable for this self-contained portable equipment.

All associated piping, components and instrumentation contained within the flowpath described above are included in the system evaluation boundary. Also included in the system evaluation boundary are the physical plant design features that consist of fire barrier walls and slabs, fire barrier penetration seals, fire doors, and fire rated enclosures located in the Reactor Building, Office Building, Turbine Building, and the Emergency Diesel Generator Building. In addition, dikes around the Unit Substation transformers are included in the evaluation boundary of the fire protection system.

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

The fire protection water system seal water supply to the circulating water, dilution and radwaste service water pumps is not required to support an intended function for the Fire Protection System and is not included within the scope of license renewal. Suppression systems that protect equipment that is not important to safety and where a fire would not significantly increase the risk of radioactive releases to the environment are also not required to support an intended function for the Fire Protection System and are not included within the scope of license renewal.

The Fire Protection System scope boundary includes portions of the system associated with the safety-related/nonsafety-related interfaces up to the location of the first seismic anchor. The boundary also includes water-filled fire protection piping and equipment in proximity to equipment performing a safety-related function, located within the Reactor Building, Turbine Building, and Office Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing. This boundary is typically shown in red for other license renewal systems, but is included within the green boundary for the Fire Protection System because it coincides with piping and equipment that perform functions associated with the fire protection (10CFR50.48) regulated event.

Not included in the Fire Protection System license renewal scoping boundary are the following systems, which are separately evaluated as license renewal systems:
Core Spray System
Condensate Transfer System
Isolation Condenser System
Instrument Air System
Circulating Water System

Reason for Scope Determination

The Fire Protection System is not in scope under 10 CFR 54.4(a)(1) because it is not relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48). The Fire Protection System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10CFR50.49), SBO (10 CFR 50.63) or ATWS (10 CFR 50.62).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). The Fire Protection System works in conjunction with fire barriers and other plant design features, and established safe shutdown systems and procedures to demonstrate compliance with fire protection regulations. 10 CFR 54.4(a)(3)
2. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The Fire Protection System has leakage boundary and structural

support intended functions, due to the connections to safety related piping, and the potential for spatial interaction with safety related equipment located in the vicinity of water-filled fire protection system piping. 10 CFR 54.4(a)(2)

UFSAR References

9.5.1

License Renewal Boundary Drawings

LR-JC-19479 sheet 1
LR-JC-19479 sheet 2
LR-JC-19479 sheet 3
LR-JC-19629 sheet 1
LR-JC-19629 sheet 2
LR-BR-2004 Sheet 2
LR-GE-885D781

Table 2.3.3.15 Fire Protection System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Dikes	Fire Barrier (Contain oil spill)
Expansion Joint	Pressure Boundary
Fire Barrier Penetration Seals	Fire Barrier
Fire Barrier Walls and Slabs	Fire Barrier
Fire Doors	Fire Barrier
Fire hydrant	Pressure Boundary
Fire Rated Enclosures	Fire Barrier
Flexible Hose	Pressure Boundary
Flow Element (Annubar)	Pressure Boundary
Gas Bottles (CO2, Halon Storage Cylinders)	Pressure Boundary
Gauge Snubber	Pressure Boundary
Gear Box	Pressure Boundary
Heat Exchangers	Heat Transfer
	Pressure Boundary
Hose Manifold	Pressure Boundary
Odorizer	Pressure Boundary
Piping and fittings	Pressure Boundary
Pump Casing (Redundant Fire Pump)	Pressure Boundary
Pump Casing (Vertical Turbine)	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Spray Nozzle (CO2, Halon)	Spray
Sprinkler Heads	Pressure Boundary
	Spray
Strainer	Filter
Strainer Body	Pressure Boundary
Tank Heater	Pressure Boundary
Tanks (CO2)	Pressure Boundary
Tanks (Fuel Oil)	Pressure Boundary
Tanks (Retarding Chamber)	Pressure Boundary
Tanks (Water Storage)	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary
Water Motor Alarm	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.15 Fire Protection System
-Summary of Aging Management Evaluation

2.3.3.16 Fuel Storage and Handling Equipment

System Purpose

The Fuel Storage and Handling Equipment system is comprised of the spent fuel storage pool and racks, the new fuel storage vault and racks, Cask Drop Protection system, and fuel handling equipment.

The spent fuel storage pool is enclosed and an integral part of the Reactor Building Structure. It is a reinforced concrete structure, completely lined with seam welded stainless steel liner plate that serves as a watertight barrier. The pool contains fourteen (14) high-density stainless steel poison racks for storage of spent fuel, ten (10) are equipped with Boraflex poison and four (4) are equipped with Boral poison. The pool is filled with 38 feet of demineralized water (25 feet above the fuel), providing adequate shielding for normal building occupancy by operating personnel. Water temperature is maintained within acceptable limits by the Spent Fuel Pool Cooling System (evaluated with the Spent Fuel Pool Cooling System). The spent fuel storage pool communicates with the reactor well through the refueling canal. Removable concrete plugs and gates are inserted in the canal opening to provide a watertight boundary; except during refueling when the reactor well is also flooded for underwater transfer of nuclear fuel. The spent fuel storage pool and the racks are classified safety related Seismic Class I structures.

The new fuel storage vault is located within the reactor building adjacent to the spent fuel storage pool. The reinforced concrete vault contains aluminum racks for dry storage of new fuel bundles. The new fuel storage vault and the racks are classified Seismic Class I structures.

The Cask Drop Protection system is a cylindrical stainless steel guide structure assembly that is permanently installed in the northeast corner of the spent fuel storage pool. The guide structure assembly consists of an upper guide cylinder and a lower dashpot cylinder. The upper guide cylinder is approximately 23 feet high, with an inside diameter of 130 inches at the top, tapering to a diameter of 118 inches at the flanged connection with the dashpot cylinder. A gated opening in the guide cylinder is provided to permit transfer of spent fuel into a cask within the cylindrical guide. The lower dashpot cylinder is approximately 16 feet high, with an inside diameter that tapers from 118 inches at the flange connection with the upper guide cylinder to 110½ inches at the bottom. The Cask Drop Protection system rests on the bottom of the spent fuel pool and is laterally braced from the pool walls. The structure is classified Seismic Class I.

Fuel handling equipment consists of the reactor building overhead bridge crane, jib cranes, the refueling platform, fuel preparation machines, and special purpose tools for handling new fuel, spent fuel, and reactor vessel internals and components.

The reactor building overhead bridge crane and the jib cranes are separately evaluated with Cranes and Hoists license renewal structure and are not described herein.

The refueling platform is a motor driven bridge and trolley which traverses the space between the reactor well and the spent fuel storage pool. The bridge travels on rails extending on both sides of the fuel storage pool and the reactor well. The trolley runs on rails located on top of the bridge. The fuel grapple is mounted on the trolley. Two auxiliary hoists are provided on the platform. The hoists are used with an assortment of refueling and component handling tools. Together with the fuel grapple, they perform all necessary tasks in the irradiated fuel and the core components.

Two fuel preparation machines are mounted on the wall of the spent fuel storage pool farthest from the reactor well. The machines consist of an aluminum frame, 40 feet long, and a carriage for the fuel bundle, which runs the full length of the frame. Power for the carriage is supplied by an air hoist mounted under the operator platform at the top of the spent fuel pool.

Special purpose tools include control rod grapple tool, control rod latch tool, fuel support installation tool, instrument handling tool, channel bolt wrench, fuel bundle sampler, and other tools specifically designed for handling nuclear fuel and for servicing reactor vessel internals during an outage.

The purpose of the Fuel Storage and Handling Equipment system is to support, transfer, and provide for storage of nuclear fuel in a manner that precludes inadvertent criticality. The spent fuel storage racks are designed to maintain fuel assemblies in a subcritical configuration having a k(eff) less than or equal to 0.95. The special purpose tools facilitate handling and transfer of nuclear fuel, and assembly and disassembly of reactor vessel internals.

The purpose of the Cask Drop Protection system in the original design was to attenuate the effects of a cask drop accident. However this function is no longer required since the reactor building crane is upgraded to a single failure proof design and a cask drop accident is no longer credible.

Included in the evaluation boundary of Fuel Storage and Handling Equipment system are new and spent fuel storage racks, the Cask Drop Protection system, the refueling platform, fuel preparation machines, and the special purpose tools. New and spent fuel storage racks are in scope of license renewal since they perform a safety related function. The Cask Drop Protection system, the refueling platform, and the fuel preparation machines are also in scope of license renewal because they are required to maintain structural integrity during a design basis seismic event (Seismic II/I) to preclude interaction with nuclear fuel. Special purpose tools are used to support refueling activities and to facilitate transfer of nuclear fuel. They do not perform an intended function and are not included in the scope of license renewal.

Not included in the evaluation boundary of the Fuel Storage and Handling Equipment system are the new fuel vault, the spent fuel storage pool, its liner plate, gates and plugs, the reactor building overhead bridge crane, jib cranes, and supports for components and tools. The new fuel vault, the spent fuel storage pool, its liner plate, and gates and plugs are separately evaluated with the Reactor Building license renewal structure. The reactor building overhead bridge crane and jib cranes are separately evaluated with Cranes and Hoists license renewal structure. Supports for components are separately evaluated with the license renewal Component Supports Commodity Group.

For more detailed information, refer to UFSAR Section 9.1

System Operation

Not required

System Boundary

Not Required

Reason for Scope Determination

The Fuel Storage and Handling Equipment system meets the scoping requirements of 10 CFR 54.4(a)(1) because it is a safety-related structure which is relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1).
The Fuel Storage and Handling Equipment system does not meet 10 CFR 54.4(a)(3) because it is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), ATWS (10 CFR 50.62), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63).

System Intended Functions

1. Prevents criticality of fuel assemblies stored in the spent fuel pool. The spent fuel storage racks maintain fuel in subcritical configuration having a k(eff) less or equal to 0.95. 10 CFR5 4.4(a)(1)
2. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). The spent fuel and the new fuel storage racks provide physical support for nuclear fuel. 10 CFR 54.4(a)(1)
3. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The refueling platform, the fuel preparation machines, and the Cask Drop Protection system are required to maintain structural integrity during design basis seismic events to preclude interaction with nuclear fuel (Seismic II/I). 10 CFR 54.4 (a)(2)

UFSAR References

9.1

License Renewal Boundary Drawings

None

Table 2.3.3.16 Fuel Storage and Handling Equipment
Components Subject to Aging Management Review

Component Type	Intended Functions
Cask Drop Protection Cylindrical Structure	Structural Support
Fuel Grapple/Mast	Structural Support
Fuel Preparation Machine	Structural Support
New Fuel Storage Racks	Structural Support
Refueling platform	Structural Support
Spent Fuel Storage Racks	Absorb Neutrons
	Structural Support
Structural Bolts	Structural Support

The aging management review results for these components are provided in
Table 3.3.2.1.16 Fuel Storage and Handling Equipment
-Summary of Aging Management Evaluation

2.3.3.17 Hardened Vent System

System Purpose

The Hardened Vent System (HVS) is a hard piped vent system designed for venting the Primary Containment during severe accident sequences.

The purpose of the HVS is to vent the primary containment via the torus (primary path) or drywell (secondary path) during severe accident sequences that involve loss of decay heat removal capability (the torus is the preferred vent path because of the scrubbing effect of the torus water). The HVS accomplishes this by providing a vent path to the ventilation stack from either the torus or drywell through the Containment Inerting System (CIS) nitrogen purge header and its associated drywell and torus nitrogen purge inlet pressure control valves.

The HVS is only used for conditions beyond the Design Basis Accident.

System Operation

The HVS is comprised of a hard pipe installed between the CIS nitrogen purge header and the plant ventilation stack. Functionally, the HVS relies on the valves and piping associated with the CIS nitrogen purge header. Torus venting via the HVS is through the CIS torus nitrogen purge inlet pressure control valves, through the CIS nitrogen purge header, through the manual HVS to stack isolation valve, through the hardened vent pipe, and out the ventilation stack. Drywell venting via the HVS is through the CIS drywell nitrogen purge inlet pressure control valves, through the CIS nitrogen purge header, through the manual HVS to stack isolation valve, through the hardened vent pipe, and out the ventilation stack. The Hardened Vent System (HVS) is designed for the mitigation of Severe Accident Sequences that are beyond the Design Basis Accident (DBA).

For more detailed information, see UFSAR Section 6.2.7.

System Boundary

The HVS begins at the normally locked closed manual HVS to stack isolation valve located off of the CIS nitrogen purge header and terminates inside the ventilation stack. The HVS pipe is provided with an enclosure boot at the penetration to the stack.

Not included in the HVS license renewal scoping boundary are the following systems/structures, which are separately evaluated as license renewal systems/structures:
Containment Inerting System (CIS)
Ventilation Stack

The Hardened Vent System (HVS) is designed for the mitigation of Severe Accident Sequences that are beyond the Design Basis Accident (DBA). Beyond Design Basis Severe Accident events are not in-scope for License Renewal. However, the HVS pipe and enclosure boot are an extension of the ventilation stack boundary and are required to maintain their pressure boundary integrity to prevent the backflow of gas effluents and unmonitored releases to the environment.

Reason for Scope Determination

The Hardened Vent System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during or following design basis events. The Hardened Vent System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Hardened Vent System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The HVS pipe and enclosure boot are an extension of the ventilation stack boundary and are required to maintain their pressure boundary integrity to prevent the backflow of gas effluents and unmonitored releases to the environment. 10 CFR 54.4(a)(2)

UFSAR References

6.2.7

License Renewal Boundary Drawings

LR-SN-13432.19-1

Table 2.3.3.17 Hardened Vent System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Enclosure Boot	Pressure Boundary
Piping and fittings	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.17 Hardened Vent System
-Summary of Aging Management Evaluation

2.3.3.18 Heating & Process Steam System

System Purpose

The intended function of the Heating and Process Steam System for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, "Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2)", dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The Heating and Process Steam System is a mechanical system designed to supply steam for processing liquid radwaste, for plant area heating, and for deaerator operation.

The purpose of the Heating and Process Steam System is to provide steam in sufficient capacity for operation of the radwaste concentrator for evaporative processing of liquid radioactive waste, for plant area heating, and to provide oxygen-free boiler feedwater. It accomplishes its purpose through use of two fuel oil fired boilers and their supporting systems including steam distribution and condensate systems, and chemical addition. Operation of the Heating and Process Steam System is not required to perform or support any safety related function and consequently the system is not safety related.

System Operation

The Heating and Process Steam System is comprised of two fuel oil fired boilers utilizing a vapor cycle. The boilers, either of which may be in operation depending on the steam requirement, are each supplied by two fuel oil pumps which take suction from the fuel oil storage tank (evaluated with the Main Fuel Oil Storage & Transfer System) and transfer fuel to the boiler burner. The boilers produce steam that discharges into a common distribution header, which discharges steam through various loops to the radwaste concentrator components, plant area heating equipment, and deaerators as required. Makeup water is from demineralized water transfer (evaluated with the Water Treatment and Distribution System).

For more detailed information, see UFSAR section 10.4.8.

System Boundary

The license renewal scoping boundary of the Heating and Process Steam System encompasses that portion of the system that is located in proximity to equipment performing a safety-related function. This includes the portions of the system located within the Reactor Building, Turbine Building, Office Building, and old Heating Boiler House. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Components that are not required to support the system's leakage boundary intended function are not included in the license renewal scoping boundary of the Heating and Process Steam System.

Not included in the Heating and Process Steam System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Water Treatment and Distribution System
Main Fuel Oil Storage & Transfer System
Radwaste Systems

Reason for Scope Determination

The Heating and Process Steam System does not meet 10 CFR 54.4(a)(1) because it is not a safety related system that is relied upon to remain functional during and following design basis events. It does meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It does not meet the requirements of 10 CFR 54.4(a)(3) since it is not required to demonstrate compliance with the Commission’s regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The Heating and Process steam System contains non-safety related water and steam-filled lines which have potential spatial interaction (spray or leakage) with safety related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

10.4.8

License Renewal Boundary Drawings

LR-BR-2015 sheet 2
LR-BR-2015 sheet 3
LR-BR-2015 sheet 4
LR-BR-2015 sheet 6

Table 2.3.3.18 Heating & Process Steam System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Coolers (Sample)	Leakage Boundary
Flexible Connection	Leakage Boundary
Flow Element	Leakage Boundary
Heat Exchangers	Leakage Boundary
Piping and fittings	Leakage Boundary
Pump Casing - Chemical Addition Pump CH-P-11	Leakage Boundary
Pump Casing - Condensate Return Pumps P-13-1A/B, Chemical Feed Addition Pumps CH-P-6A/B, Boiler No. 1 Feed Pumps CH-P-4A/B, Boiler No. 2 Feed Pumps CH-P-3A/B, Deaerator Feed Pumps CH-P-5A/B, Chemical Recirc Pump CH-P-10	Leakage Boundary
Restricting Orifice	Leakage Boundary
Sight Glasses	Leakage Boundary
Soot Blowers	Leakage Boundary
Steam Trap	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks - Chemical Feed Addition Tanks CH-T-3A/B	Leakage Boundary
Tanks - Deaerator CH-T-2, Condensate Return Unit T-13-1, Heating Boiler Condensate Storage Tank T-13-2, Heating Boiler Flash Tank T-13-3	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.18 Heating & Process Steam System
-Summary of Aging Management Evaluation

2.3.3.19 Hydrogen & Oxygen Monitoring System

System Purpose

The Hydrogen & Oxygen Monitoring License Renewal System consists of the Drywell Hydrogen/Oxygen Monitoring Subsystem and the Drywell and Torus Oxygen Monitoring Subsystem. The Hydrogen & Oxygen Monitoring System is in scope for license renewal. However, portions of the Hydrogen & Oxygen Monitoring System are not required to perform intended functions and are not in scope. The Hydrogen & Oxygen Monitoring System has several interfaces with other systems that are not in the license renewal boundary of the Hydrogen & Oxygen Monitoring System.

The Hydrogen & Oxygen Monitoring System is a gas sampling system designed to monitor the hydrogen and oxygen concentration in the drywell during accident conditions. A portion of the Hydrogen & Oxygen Monitoring System is designed to monitor the oxygen concentration in the drywell and torus during normal power operations.

The purpose of the Hydrogen & Oxygen Monitoring System is to monitor the Primary Containment atmosphere to ensure that oxygen and hydrogen levels do not approach flammability limits. The Hydrogen & Oxygen Monitoring System accomplishes this purpose post accident and during normal power operations. During post accident operation, the Drywell Hydrogen/Oxygen Monitoring Subsystem portion of the Hydrogen & Oxygen Monitoring System processes a drywell atmosphere sample through one of two redundant hydrogen and oxygen measuring loops. During normal power operation, the Drywell Hydrogen/Oxygen Monitoring Subsystem is in the standby mode except for calibration or maintenance and the Drywell and Torus Oxygen Monitoring Subsystem portion of the Hydrogen & Oxygen Monitoring System is in service to monitor the oxygen concentration of the atmosphere in the drywell and torus areas.

System Operation

The Drywell Hydrogen/Oxygen Monitoring Subsystem is comprised of two redundant drywell hydrogen and oxygen measuring loops each consisting of a hydrogen and oxygen analyzer, sample pump, indicators, recorder, system trouble alarm, calibration and reagent gas bottles and valves, and a control switch with indicating lights for the manual containment isolation valves. The indicators, recorders, alarms and control switches are located in the Main Control Room. The Drywell Hydrogen/Oxygen Monitoring Subsystem is initiated manually. A containment atmosphere sample is drawn from the drywell dome airspace through electrically heat traced sample lines. Flow continues through two series manual solenoid operated containment isolation valves prior to passing through the hydrogen and oxygen analyzers. From the analyzers, sample flow passes through the sample pump and two series manual solenoid operated containment isolation valves after which it is returned to the drywell through an open-ended sample return line.

The Drywell and Torus Oxygen Monitoring Subsystem is comprised of an oxygen analyzer for the Drywell area and an oxygen analyzer for the Torus area. Both the Drywell and the Torus oxygen analyzing systems include an oxygen analyzer, sample pump, indicators, a recorder, a system trouble alarm, calibration and reagent gas bottles and valves, and switches to allow for local operation of the oxygen analyzing systems from within the Reactor Building. Remote instrumentation and controls for each of the oxygen analyzing systems are also located in the

Main Control Room. The Drywell and Torus Oxygen Monitoring Subsystem is initiated manually. For the drywell, a containment atmosphere sample is drawn from the drywell ring header through two series automatic solenoid operated containment isolation valves and a drywell oxygen analyzer bypass valve (to the Post Accident Sampling System). Flow continues through a water separator, filters, sample pump, and drywell oxygen analyzer prior to discharge to the Reactor Building Floor and Equipment Drain System. For the torus, a torus atmosphere sample is drawn from the torus airspace through two series automatic solenoid operated containment isolation valves and a torus oxygen analyzer bypass valve (to the Post Accident Sampling System). Flow continues through a water separator, filters, sample pump, and torus oxygen analyzer prior to discharge to the Reactor Building Floor and Equipment Drain System. Upon primary containment isolation (reactor low low level, hi drywell pressure), the drywell and torus sample pumps will trip and the drywell and torus containment isolation valves will close. The containment isolation valves on the drywell and torus sample lines are provided with bypass logic in order to re-establish a sample flowpath to the Post Accident Sampling System (PASS) which shares the drywell and torus sample supply flowpath with the Drywell and Torus Oxygen Monitoring Subsystem.

For more detailed information, see UFSAR Sections 6.2.5 and 7.6.1

<u>System Boundary</u>

The boundary of the Drywell Hydrogen/Oxygen Monitoring Subsystem begins at the Drywell dome sample inlet, continues through the hydrogen and oxygen analyzers, and ends at an open ended connection in the sample return line inside the drywell. Included in the boundary are the hydrogen and oxygen calibration and reagent gas bottles and their piping connections to the hydrogen and oxygen analyzers. All associated piping, components, and instrumentation contained within the boundary described are included within the system evaluation boundary. This boundary is similar for both redundant measuring loops. Also included in the boundary of the Drywell Hydrogen/Oxygen Monitoring Subsystem is the Post Accident Sampling System sample inlet branch connection located off of the sample inlet line from the Drywell dome airspace to the "A" panel of the Drywell Hydrogen/Oxygen Monitoring System.

The boundary of the Drywell and Torus Oxygen Monitoring Subsystem includes separate boundaries for the drywell and for the torus oxygen monitoring loops. The drywell oxygen monitoring loop begins at the drywell ring header and continues through the drywell oxygen analyzer bypass valve (to the Post Accident Sampling System), through the drywell oxygen analyzer, and ends at the sample discharge to the Reactor Building Floor and Equipment Drain System. The torus oxygen monitoring loop begins at the torus airspace sample inlet connection and continues through the torus oxygen analyzer bypass valve (to the Post Accident Sampling System), through the torus oxygen analyzer, and ends at the sample discharge to the Reactor Building Floor and Equipment Drain System. All associated piping, components, and instrumentation contained within the boundaries described are included within the system evaluation boundary.

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

Not included in the Hydrogen & Oxygen Monitoring System license renewal scoping boundary are the following systems, which are separately evaluated as license renewal systems:
Primary Containment
Reactor Building Floor and Equipment Drain System
Post Accident Sampling System
Radiation Monitoring System

Not included in the boundary of the Drywell and Torus Oxygen Monitoring Subsystem are the drywell and torus oxygen analyzer bypass valves and their branch sample lines to the Post Accident Sampling System which are evaluated with the Post Accident Sampling System for license renewal scoping. Also not included in the boundary of the Drywell and Torus Oxygen Monitoring Subsystem are the containment isolation valves and branch line connections to and from the Containment Atmosphere Particulate and Gaseous Radioactivity Monitoring System which are evaluated with the Radiation Monitoring System for license renewal scoping.

The oxygen analysis portion of the Drywell and Torus Oxygen Monitoring Subsystem, exclusive of both of the containment isolation boundaries, does not support the intended functions of the Hydrogen & Oxygen Monitoring System and is not included within the scope of license renewal. Loss of the electric heat trace on the Drywell Hydrogen/Oxygen Monitoring Subsystem sample lines does not change the operator response to the design basis accident. Therefore, the sample line electric heat trace is not required to support the intended functions of the Hydrogen & Oxygen Monitoring System and is not included within the scope of license renewal.

<u>Reason for Scope Determination</u>

The Hydrogen & Oxygen Monitoring System meets 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The Hydrogen & Oxygen Monitoring System meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Hydrogen & Oxygen Monitoring System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49). The Hydrogen & Oxygen Monitoring System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), ATWS (10 CFR 50.62), or Station Blackout (10 CFR 50.63).

<u>System Intended Functions</u>

1. Provide primary containment boundary. The Hydrogen & Oxygen Monitoring System sample lines that penetrate the primary containment have containment isolation valves. 10 CFR 54.4(a)(1)
2. Control combustible gas mixtures in the primary containment atmosphere. The Hydrogen & Oxygen Monitoring System analyzes the primary containment atmosphere post LOCA for hydrogen and oxygen concentration. 10 CFR 54.4(a)(1)
3. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a

safety related function. The Hydrogen & Oxygen Monitoring System contains non-safety related water filled lines in the Reactor Building which have potential spatial interaction (spray or leakage) with safety related SSCs, and, it contains non-safety related piping that provides structural support for safety related piping. 10 CFR 54.4(a)(2)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). The Drywell Hydrogen/Oxygen Monitoring Subsystem containment isolation valves and analyzers are Environmentally Qualified. 10 CFR 54.4(a)(3)

UFSAR References

7.6.1.4.3
6.2.5.2.2
Table 6.2-12

License Renewal Boundary Drawings

LR-GU-3E-666-21-1000
LR-BR-M0012
LR-GU-3E-243-21-1000
LR-OC-010520

Table 2.3.3.19 Hydrogen & Oxygen Monitoring System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Drain Trap (O2 Analyzers)	Leakage Boundary
Filter Housing (O2 Analyzers)	Leakage Boundary
Flexible Hose	Pressure Boundary
Flow Element	Pressure Boundary
Heat Exchangers (Air Cooled)	Pressure Boundary
Moisture Separator (H2O2 Analyzers)	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
	Structural Support
Pump Casing	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Sensor Element	Pressure Boundary
Tanks (Volume Chamber)	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
Water Separator (O2 Analyzers)	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.19 Hydrogen & Oxygen Monitoring System
-Summary of Aging Management Evaluation

2.3.3.20 Instrument (Control) Air System

System Purpose

The Instrument Air System is in scope for License Renewal. However, major portions of the system are not required to perform intended functions and are not in scope.

The purpose of the system is to provide clean and dried compressed air to pneumatically operated instruments and valves. To accomplish this purpose, the Instrument Air System receives compressed air from the Service Air System, and processes the compressed air through air dryers for distribution to components in support of plant operation.

The Instrument Air system also penetrates the drywell and is isolated by the closing of the instrument air containment isolation valve. This instrument air supply to the drywell is charged with nitrogen during power operation to reduce combustible gas in the drywell and torus with compressed air as a backup. This function is evaluated in the Nitrogen Supply License Renewal System.

System Operation

The Instrument Air System is comprised primarily of piping, valves, accumulators, regulators, tubing, air dryers and filters. The Instrument Air starts at the supply connection from the Service Air System and terminates at the connections to the supplied pneumatic components. Compressed air from the Service Air System is supplied thru a single instrument air line to the Instrument Air system dryers and filters prior to distribution as processed air.

During normal plant operation the Service Air compressors operate continuously to supply the source of the plants required instrument and control air and keep the accumulators charged. Where required, pneumatically operated devices are designed to fail safe upon loss of air or are provided with accumulators to provide a stored volume of compressed air when the compressors or other non safety related sections of the instrument air system are unavailable. Accumulators are isolated by check valves to ensure backup air for components credited to function during or following design basis events.

Compressed air from the Service Air Systems air receivers charge the instrument air supply line and is sent to the Instrument Air System dryers and filters prior to distribution as processed air. The dryers and filters are located in the Turbine Building. The two instrument air dryers will cycle, one on and one off, depending on moisture loading of the desiccant, and provide air that exceeds the quality standards for instrument air. A single dryer discharge line then charges the main instrument air ring header in the turbine building. Manual shutoff valves are provided both along the ring header and at the connections of smaller headers and taps from which instrument air is supplied to the plant. Two headers off the ring header supply the Reactor Building instrument air. One supplies the outboard Main Steam Isolation Valves (MSIVs) in the Trunnion Room. The other supplies the Reactor Building loads and provides a connection to the Drywell with its connection to the Nitrogen Supply System. It also supplies two additional air receivers located in the New Radwaste and Offgas Buildings before distribution to equipment located in those buildings. The receivers reduce the effects of load demands for instrument air at other plant locations. The Boiler House, Old Radwaste Building, Chlorine Building, Intake Structure, Condensate Transfer Pump House and the Standby Gas Treatment System are also provided instrument air. The headers provide instrument (control) air to individual plant components. Where instruments or air operated valve loads require reduced pressure, pressure reducing valves are utilized.

The Instrument Air System requires only compressed air from the Service Air System and electric power for dryers and solenoid operated valves. Air from the Service Air compressors and the instrument air dryers is not required for safe shutdown of the plant. Instrument air is required for normal plant operation and is used to hold the control rod scram valves closed. Upon loss of air the scram valves will open and shut down the reactor. Reliability for the Instrument Air System is enhanced by three full capacity service air compressors and isolation of the service air system header upon low air pressure. Plant air operated valves and pneumatic control devices are also designed to fail safe upon loss of air or are supplied with accumulators to permit continued operation.

For more detailed information, see UFSAR section 9.3.1.

System Boundary

The Instrument Air System boundary begins at the supply connection from the Service Air System. The system boundary contains the instrument air dryers and filters that discharge into the Turbine Building air ring header that distributes air to the individual plant components through piping headers and branches. The system boundary includes piping downstream of the instrument air dryers, main instrument air header, instrument air receivers, connections of smaller headers, manual shutoff valves, pressure reducing valves, check valves, accumulators and all associated piping components and instrumentation. The system boundary ends at the individual connection to the supplied pneumatic instruments and air operated valves.

Not included in the scoping boundary are the pneumatic instrumentation and air operated valves supplied by instrument air in the Main Steam, Standby Gas Treatment, Containment Vacuum Breaker, Nitrogen, Reactor Building Ventilation and Condensate Transfer host systems which are separately evaluated in the their License Renewal systems.

Not included in the scoping boundary are the service air compressors which are evaluated with the Service Air System for license renewal scoping.

The Instrument Air System receiver tanks, dryers, filters and headers, isolation valves and branch piping up to check valves of accumulators supplied pneumatic devices are not required to support intended functions and are not included within the scope of license renewal components.

The Instrument Air System supports the intended functions of pneumatic components requiring air for operation by the discharge of compressed air from accumulators. Thus, those portions of the Instrument Air System that are in scope of license renewal start at the isolation check valves upstream of the individual air accumulator that supplies the in line solenoid valves and ends at the host pneumatic components. Additionally the drywell penetration spool and associated isolation valves are in scope for their containment isolation function. As previously described, the host components are separately evaluated in their associated License Renewal Systems.

Also included in the portion of the IA system in scope for license renewal are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to and including the first seismic anchor. For more information, refer to the

License Renewal Boundary Drawing for identification of this boundary, shown in red.

Reason for Scope Determination

The Instrument Air System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The Instrument Air System meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49) and SBO (10 CFR 50.63). The Instrument Air System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62).

System Intended Functions

1. Provide motive power to safety related components. Accumulators are connected to air operated valves. 10 CFR 54.4(a)(1)
2. Provides primary containment boundary. Isolation valves on instrument air line to drywell. 10 CFR 54.4(a)(1)
3. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). Provides pneumatic motive force to air operated valves and control devices. 10 CFR 54.4(a)(3)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). EQ in line solenoid valves control air flow to valve operators and control devices. 10 CFR 54.4(a)(3)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). Provides pneumatic motive force to air operated valves and control devices. 10 CFR 54.4(a)(3)

UFSAR References

9.3.1

License Renewal Boundary Drawings

LR-BR-2013 sheet 5
LR-BR-2013 sheet 6
LR-BR-2013 sheet 7
LR-GE-148F723
LR-BR-2002 sheet 1
LR-BR-2002 sheet 2
LR-BR-2011 sheet 2
LR-GU-3E-822-21-1000
LR-GU-3E-243-21-1000
LR-SN-13432.19-1
LR-BR-2004 sheet 2

Table 2.3.3.20 Instrument (Control) Air System
Components Subject to Aging Management Review

Component Type	Intended Functions
Accumulator	Pressure Boundary
Closure bolting	Mechanical Closure
Filter Housing	Pressure Boundary
	Structural Support
Flexible Hose	Pressure Boundary
Flow Element	Structural Support
Piping and fittings	Pressure Boundary
	Structural Support
Valve Body	Pressure Boundary
	Structural Support

The aging management review results for these components are provided in
Table 3.3.2.1.20 Instrument (Control) Air System
-Summary of Aging Management Evaluation

2.3.3.21 Main Fuel Oil Storage & Transfer System

System Purpose

The intended function of the Main Fuel Oil Storage & Transfer System for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, "Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2)", dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction only.

The Main Fuel Oil Storage & Transfer System is a mechanical system designed to store and transfer fuel oil to the Heating and Process Steam System and to the Emergency Diesel Generator Fuel Storage Tank under normal plant operating conditions.

System Operation

The Main Fuel Oil Storage and Transfer System receives fuel oil from tank trucks and stores it in a tank located in the yard. Fuel oil is conveyed to the #1 and #2 heating boilers by a transfer pump and is pressurized by boiler fuel pumps and fed to the boilers for combustion. The system supplies bottled propane to both heating boilers for ignition, and supplies atomizing air to the #2 heating boiler.

The system can be aligned to provide fuel oil to the Emergency Diesel Generator fuel oil tank, but is not credited for Diesel Generator operation.

For more detailed information, see UFSAR Section 9.5.4.

System Boundary

The license renewal scoping boundary of the Main Fuel Oil Storage & Transfer System encompasses that portion of the system which is located in proximity to equipment performing a safety-related function. This includes those portions of the system which are located within the Heating Boiler House. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of the Main Fuel Oil Storage and Transfer System. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scoping boundary of the Main Fuel Oil Storage and Transfer System are those portions located in the yard or buried, because those portions are not located within an area in proximity to components performing a safety related function. Components that are not required to support the systems leakage boundary intended function are not included in the scoping boundary.

Reason for Scope Determination

The Main Fuel Oil Storage & Transfer System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during or following a design basis event. It is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54(a)(1). The Main Fuel Oil Storage & Transfer System does not meet 10 CFR 54.4(a)(3) since it is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)

UFSAR References

9.5.4
10.4.8

License Renewal Boundary Drawings

LR-BR-2015 sheet 3
LR-BR-2015 sheet 5

Table 2.3.3.21 Main Fuel Oil Storage & Transfer System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Flexible Hose	Leakage Boundary
Flow Meter	Leakage Boundary
Piping and fittings	Leakage Boundary
Pump Casing	Leakage Boundary
Sight Glasses	Leakage Boundary
Strainer Body	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.21 Main Fuel Oil Storage & Transfer System
-Summary of Aging Management Evaluation

2.3.3.22 Miscellaneous Floor and Equipment Drain System

System Purpose

The Miscellaneous Floor and Equipment Drain (MFED) system consists of both gravity and pumped fluid lines designed to provide collection of plant liquid effluents from floor drains and equipment drains located in various building structures, and subsequent transfer of the drainage for appropriate processing by the Radwaste System, overboard discharge, or disposal. The MFED system consists of Turbine Building Floor and Equipment Drains, Offgas Building Floor and Equipment Drains, Radwaste Floor and Equipment Drains, Laundry and Laboratory Drains, Miscellaneous Building Sumps, Condensate Transfer Building Sump, and Miscellaneous Oil Drains systems.

The purpose of the MFED system is to provide for collection of floor drains and equipment drains located in various locations throughout the site, and transfer of the collected drainage to the Radwaste System for processing, overboard discharge, or disposal. The MFED system accomplishes this purpose though use of gravity drain lines, sumps, tanks, pumps, and monitoring instruments used to collect and classify waste drainage. The MFED system is designed to accommodate the volumes of fluids resulting from maintenance activities, system flushing, rinsing operations, and other plant work, and is sized to minimize any potential for plant flooding. No part of the MFED system is required for the safe shutdown of the reactor or to mitigate the consequence of any postulated accident. Floor drains in the cable spreading rooms in the Turbine Building are credited in existing analyses with accommodating water flow resulting from actuation of the fire suppression systems in those rooms.

System Operation

The Turbine Building Floor and Equipment Drains are comprised of various floor drains and equipment drains, sumps, high and low conductivity drain tanks, pumps for each sump and tank, and associated piping and instrumentation. The offgas building floor and equipment drains, sump, pump, and piping are also evaluated with this portion of the system. Drains are directed into the various sumps and tanks, and then pumped to the Radwaste System chemical waste floor drain collection tanks, high purity waste system, or overboard discharge depending on the nature and source of the drainage.

The Radwaste Floor and Equipment Drains are comprised of floor and equipment drains, sumps, tanks, pumps and associated piping and instrumentation located in both the Old Radwaste and New Radwaste buildings. Drains associated with the processing of radwaste are directed into the various sumps and tanks in these buildings (e.g., discharge from Reactor Building Floor Drain Sump 1-7 may be directed to the Chemical Waste Floor Drain Collection Tanks), and then routed for continued processing as appropriate.

The Laundry and Laboratory Drains are routed to tanks located in the northwest corner of the reactor building basement. The Laundry Drain Tank receives floor and equipment drains from the Cold Chemistry and Instrument Laboratories and the cask washdown (decontamination) area. It is equipped with one pump which discharges to either the Chemical Waste Floor Drain Collection Tanks or the Waste Neutralizer Tanks (evaluated with the Radwaste System). The Laboratory Drain Tank receives floor and equipment drains from the Hot Chemistry Laboratory, which may include chemical reagents used in process sampling as well as plant grade water. It is equipped with one pump which can discharge to the Chemical Waste Floor

Drain Collection Tanks or Waste Neutralizer Tank A as appropriate.

The Miscellaneous Building Sumps system collects floor and equipment drainage from the Low Level Radwaste Facility. This system consists primarily of gravity drains, a sump, pump, and associated piping and controls. The sump contents can be discharged to a portable tank or to a portable demineralizer system as appropriate.

The Condensate Transfer Building Sump is located in the Condensate Transfer Building outside the turbine building west wall. It receives floor and equipment drains from the chlorination building and condensate transfer sump area. It is equipped with a pump which discharges to the turbine building under-condenser area via the Condensate Storage Tank/Demineralized Water Storage Tank overflow line. Drains in this area of the turbine building ultimately empty into the Turbine Building 1-3 sump.

The Miscellaneous Oil Drains system consists of valved and capped drain points on the five Recirculation System Motor-Generator set oil cooler shell side oil drains and one location on the Service Air Compressor 1-3 crankcase oil drain. Local provisions are made to collect the drained oil for sampling and maintenance activities at these locations when appropriate.

For more detailed information, see UFSAR section 9.3.3, and 11.2.2.

<u>System Boundary</u>

The license renewal scoping boundary of the Miscellaneous Floor and Equipment Drain (MFED) system begins with the individual floor drains of the Turbine Building Floor and Equipment Drains system that are located in the Old and New Cable Spreading Rooms and continue through gravity lines to the 1-1 Turbine Building Sump. Also included are floor drain lines in the New Cable Spreading Room that gravity drain to the existing roof drain downcomer in the Office Building. These lines are relied on to prevent flooding of the Cable Spreading Rooms during actuation of their respective portions of the Fire Protection System.

Also included in the license renewal scoping boundary of the MFED system are liquid-filled portions of the system that are located in proximity to equipment performing a safety-related function. This includes the liquid-filled portions of the system located within the Reactor Building, Turbine Building, and Heating Boiler House. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Not included in the scope of license renewal are the Radwaste Floor and Equipment Drains, and Miscellaneous Building Sumps, as these systems are not located within an area in proximity of components performing a safety-related function. Components that are not required to support the system's leakage boundary intended function and have no other intended function are not included in the scope of license renewal. Also not included are floor and equipment drain portions of the MFED that are encased in concrete (except for floor drains from the Old and New Cable Spreading Rooms, as described above), as leakage in this environment does not have the potential for spatial interaction.

Not included in the MFED boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Radwaste System

Reactor Building Floor and Equipment Drains
Drywell Floor and Equipment Drains
Fire Protection System
Roof Drains and Overboard Discharge

Reason for Scope Determination

The Miscellaneous Floor and Equipment Drain (MFED) system does not meet 10 CFR 54.4(a)(1) because it is not a safety related system that is relied upon to remain functional during and following design basis events. It does meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48). The MFED system is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The MFED system has the potential for spatial interaction with safety-related equipment located within the Reactor Building, Turbine Building, and Heating Boiler House. 10 CFR 54.4(a)(2)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). Portions of the MFED are relied upon to remove credible water flow due to actuation of the Fire Protection System in the Turbine Building. 10 CFR 54.4(a)(3)

UFSAR References

9.3.3
11.2.2

License Renewal Boundary Drawings

LR-JC-147434 sheet 2
LR-JC-147434 sheet 3
LR-GE-148F437 sheet 2
LR-GE-148F437 sheet 12
LR-BR-2006 sheet 5
LR-BR-2007 Sheet 1
LR-BR-2007 Sheet 3
LR-BR-2015 Sheet 6

Table 2.3.3.22 Miscellaneous Floor and Equipment Drain System Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Flexible Hose	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (Lab Drain Tank Pump P-22-003)	Leakage Boundary
Pump Casing (Laundry Drain Tank Pump P-22-002)	Leakage Boundary
Pump Casings (Regeneration Waste Transfer Pumps P-22-28A,B and P-22-29A,B)	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks (Lab Drain Tank T-22-003)	Leakage Boundary
Tanks (Laundry Drain Tank T-22-002)	Leakage Boundary
Tanks (Oil Separator DS-Y-105 and Oil Receiver DS-T-1)	Leakage Boundary
Tanks (Regeneration System Waste Tank 1-1 Low and High Conductivity Compartments)	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.22 Miscellaneous Floor and Equipment Drain System
-Summary of Aging Management Evaluation

2.3.3.23 Nitrogen Supply System

System Purpose

The Nitrogen Supply System is in scope for License Renewal. However, portions of the system are not required to perform intended functions and are not in scope. The Nitrogen Supply System has several interfaces with other systems that are not in the license renewal boundary of the Nitrogen Supply System.

The Nitrogen Supply System is a pressurized gas system designed to provide nitrogen to the Containment Inerting System (CIS), drywell nitrogen sub-system, Traveling In-Core Probe (TIP) System indexing mechanisms, feedwater heaters, Reactor Water Cleanup (RWCU) System recirculation pump surge tank, and Control Rod Drive (CRD) System accumulator nitrogen charging system.

The purpose of the Nitrogen Supply System is to supply vaporized nitrogen at a specified pressure and temperature to the CIS, drywell nitrogen sub-system, TIP System indexing mechanisms, and feedwater heaters. The Nitrogen Supply System accomplishes this by processing stored liquid nitrogen through a vaporizer, heaters, and pressure regulating valves and providing it to the CIS, drywell nitrogen sub-system, TIP System indexing mechanisms, and feedwater heaters on demand.

The Nitrogen Supply System also provides nitrogen to the RWCU System recirculation pump surge tank and the CRD System accumulator nitrogen charging system. This portion of the Nitrogen Supply System consists of local bottled nitrogen supplies, pressure regulators, and piping.

The Nitrogen Supply System is manually initiated to support its users. The nitrogen supply to the TIP System indexing mechanisms penetrates the primary containment and is provided with containment isolation devices.

System Operation

The Nitrogen Supply System is comprised of a liquid nitrogen storage tank, pressure building coils, vaporizer, electric heaters, thermostatic control valves, pressure regulating devices, piping, valves, and system instrumentation and controls. The Nitrogen Supply System is initiated manually.

The Nitrogen Supply System has two major users which are the CIS nitrogen purge header and the CIS nitrogen makeup header. For the CIS nitrogen purge header, flow is from the liquid nitrogen storage tank, through a vaporizer, trim heaters, thermostatic control valve, and pressure regulating valves. The CIS nitrogen purge header branches off of the nitrogen supply line downstream of the pressure regulating valves. The CIS nitrogen purge header includes a connection outside of the reactor building to allow the hookup of a portable supply of nitrogen to the CIS nitrogen purge header in the event the permanent liquid nitrogen tank is unavailable. The feedwater heater nitrogen layup supply also branches off of the nitrogen supply line downstream of the pressure regulating valves. The feedwater heater nitrogen layup supply is normally isolated from the Nitrogen Supply System by a removable spool piece.

For the CIS nitrogen makeup header, flow is from the liquid nitrogen storage tank, through a vaporizer, pressure regulating valve, electric heater, and then to the CIS nitrogen makeup header. Both the TIP System indexing mechanism purge supply and the nitrogen supply to the drywell nitrogen sub-system branch off of the CIS nitrogen makeup header. TIP indexing purge flow, which provides a drying and inerting function for the TIP tubes, passes through a nitrogen regulating valve, an automatic containment isolation valve, and a check valve prior to entering the primary containment. Flow continues to the TIP indexing mechanisms. The nitrogen supply to the drywell nitrogen sub-system flows to the drywell nitrogen compressors, continues to the drywell nitrogen storage tank, ties into the Instrument (Control) Air pneumatic supply line to the drywell upstream of the Instrument (Control) Air System primary containment isolation valves, then flows into the drywell through the Instrument (Control) Air System primary containment isolation valves to the pneumatically operated devices in the drywell.

The Nitrogen Supply System also provides nitrogen to the RWCU System recirculation pump surge tank for pressure surge suppression. This portion of the Nitrogen Supply System consists of local bottled nitrogen supplies, pressure regulators, and piping. The nitrogen Supply System also provides nitrogen to the CRD System accumulator nitrogen charging system. This portion of the Nitrogen Supply System consists of local bottled nitrogen supplies, pressure regulators, and piping and is normally disconnected from the CRD accumulators.

For more detailed information, see UFSAR Section 6.2.5.

System Boundary

The Nitrogen Supply System boundary begins at the liquid nitrogen tank and continues through the pressure building coils and vaporizer. From the vaporizer, the Nitrogen Supply System branches off to support the CIS nitrogen purge header and the CIS nitrogen makeup header. The Nitrogen Supply System evaluation boundary supporting the CIS nitrogen purge header includes trim heaters, thermostatic control valves, pressure regulating valves, and piping prior to ending at the CIS nitrogen purge header. Also included in the Nitrogen Supply System evaluation boundary is the portable nitrogen supply connection located off of the CIS nitrogen purge header. The Nitrogen Supply System evaluation boundary supporting the CIS nitrogen makeup header includes nitrogen regulating and bypass valves, an electric line heater, and piping prior to ending at the CIS nitrogen makeup header. Also included in the Nitrogen Supply System evaluation boundary are the nitrogen branch lines for TIP System purge and the drywell nitrogen compressors located off of the CIS nitrogen makeup header. The portion of the evaluation boundary supporting the TIP System nitrogen purge starts at the CIS nitrogen makeup header and continues through the purge line flow indicator and regulating valve, and includes the automatic containment isolation valve, containment isolation check valve, and nitrogen piping up to the tip indexers. The Nitrogen Supply System evaluation boundary also includes the TIP System purge instrumentation reference leg from the Tip indexers up to and including the manual containment isolation valve. The portion of the Nitrogen Supply System evaluation boundary supporting the drywell nitrogen compressors starts at the CIS nitrogen makeup header and continues up to, and includes, the drywell nitrogen compressors, nitrogen storage tank, and nitrogen piping up to the connection to the Instrument (Control) Air System. All associated piping, components, and instrumentation contained within the boundary described above are included in the boundary.

Not included in the Nitrogen Supply System license renewal scoping boundary are the following systems, which are separately evaluated as license renewal systems:
Containment Inerting System

Traveling In-Core Probe System
Reactor Water Cleanup System
Control Rod Drive System
Instrument (Control) Air System

The Nitrogen Supply System piping and components associated with feedwater heater layup are normally isolated from the Nitrogen Supply System by a removable spool piece and are not required to support intended functions. This portion of the Nitrogen Supply System is not included in the scope of license renewal. The drywell nitrogen storage tank and components associated with providing a pneumatic nitrogen supply to drywell pneumatically actuated valves during normal power operation are not required to support intended functions and are not included in the scope of license renewal. The nitrogen piping inside the primary containment up to the TIP indexers is not required to support intended functions and is not included within the scope of license renewal. The local nitrogen supplies to the RWCU System recirculation pump surge tank and CRD System accumulator nitrogen charging system are not required to support intended functions and are not included in the scope of license renewal.

The Nitrogen Supply System supports the primary containment boundary intended function. This portion of the system includes the nitrogen supply to the TIP System indexers starting from the automatic containment isolation valve and continuing to the containment penetration. Also included is the TIP purge instrumentation reference leg piping from the containment penetration up to and including the manual isolation valve.

The Nitrogen Supply System supports the primary containment combustible gas control intended function. This portion of the Nitrogen Supply System starts at the liquid nitrogen tank and continues through the pressure building coils, vaporizer, trim heaters, thermostatic control valve, pressure regulating valves, and CIS nitrogen purge header. This boundary includes the portable nitrogen supply connection located off of the CIS nitrogen purge header. Also included in this boundary is the nitrogen supply line between the vaporizer and the makeup line header regulating and bypass valves. This boundary excludes the normally isolated nitrogen layup supply to the feedwater heaters.

The Nitrogen Supply System supports the Fire Protection intended function. This portion of the system is the same as that identified for the combustible gas control intended function described above but also includes the nitrogen supply line downstream of the makeup line header regulating and bypass valves up to the makeup line electric heater, and, it includes the nitrogen branch lines for TIP System purge and drywell nitrogen compressors off of the CIS nitrogen makeup header. The TIP System purge nitrogen supply line starts at the CIS nitrogen makeup header and continues through the purge line flow indicator and regulating valve up to the automatic containment isolation valve and containment penetration. The drywell nitrogen compressor supply starts at the CIS nitrogen makeup header and continues up to, and includes, the drywell nitrogen compressors. The TIP System purge and drywell nitrogen compressor supply lines do not functionally support the intended function for Fire Protection but are included as they define the Nitrogen Supply System pressure boundary necessary to support this intended function.

<u>Reason for Scope Determination</u>

The Nitrogen Supply System meets 10 CFR 54.4(a)(1) because portions of the system are relied on to remain functional during and following design basis events. The Nitrogen Supply

System is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Nitrogen Supply System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48). The Nitrogen Supply System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. The Nitrogen Supply System includes containment isolation devices that function to prevent the release of radioactive contamination through system lines. - 10 CFR 54.4(a)(1)
2. Control combustible gas mixtures in the primary containment atmosphere. The Nitrogen Supply System supports the Containment Inerting System in accomplishing the function of post LOCA combustible gas control of the primary containment atmosphere. - 10 CFR 54.4(a)(1)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The Nitrogen Supply System is credited with establishing the inert drywell environment in which a design basis fire cannot occur. The Nitrogen Supply System is not required to function during a fire or survive a fire. The Nitrogen Supply System supports the Containment Inerting System in accomplishing this function. - 10 CFR 54.4(a)(3)

UFSAR References

1.9.21
3.1.37
6.2.5
Table 6.2-12

License Renewal Boundary Drawings

LR-SN-13432.19-1
LR-BR-2013 sheet 6

Table 2.3.3.23 Nitrogen Supply System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Drip Leg	Pressure Boundary
Heat Exchangers (Electric Heater)	Pressure Boundary
Heat Exchangers (Trim Heater)	Heat Transfer
	Pressure Boundary
Heat Exchangers (Vaporizer)	Heat Transfer
	Pressure Boundary
Piping and fittings	Pressure Boundary
Pressure Building Coils	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Rupture Disks	Pressure Boundary
Sight Glasses (Flow Indication)	Pressure Boundary
Strainer	Filter
Strainer Body	Pressure Boundary
Tanks	Pressure Boundary
Thermowell	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.23 Nitrogen Supply System
-Summary of Aging Management Evaluation

2.3.3.24 Noble Metals Monitoring System

System Purpose

The intended function of the Noble Metals Monitoring System (NMMS) for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, "Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2)", dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The NMMS is a reactor coolant monitoring system designed for determining the effectiveness of the Noble Metal Chemical Addition (NMCA) injection process performed during the 1R19 Refueling Outage. The NMMS is operated when the plant is at power and the Reactor Water Cleanup (RWCU) System is in operation.

The purpose of the NMMS is to track and trend the integrity of the noble metals film applied to the reactor internals and recirculation piping to ensure its ability to support Hydrogen Water Chemistry (HWC) in the mitigation of Intergranular Stress Corrosion Cracking (IGSCC). The NMMS accomplishes this by monitoring the electrochemical corrosion potential (ECP) of the reactor coolant, simulating and trending noble metals deposition, and monitoring and recording NMMS parameters. Manual valves local to the NMMS are used to place the system in service.

System Operation

The NMMS is comprised of an ECP monitor, a durability monitor, and a data acquisition system. The NMMS draws a small flow of reactor coolant from upstream of the RWCU Regenerative Heat Exchanger through normally open manual valves. The reactor coolant flows through an ECP monitor where the corrosivity of the reactor coolant is monitored with respect to the noble metals treated surfaces, a durability monitor where noble metals deposition and wear rate are simulated and trended, and a data acquisition system which monitors and records the durability monitor flowrate, temperature and ECP readings. Flow is returned to the RWCU System downstream of the Non-Regenerative Heat Exchangers through normally open manual valves.

The NMMS is provided with manual isolation valves to allow it to be isolated from the RWCU process line for sample removal and maintenance without affecting RWCU operation.

For more detailed information, see UFSAR Section 5.2.

System Boundary

The license renewal scoping boundary of the NMMS encompasses that portion of the system that is located in proximity to equipment performing a safety-related function. This includes the whole NMMS as this system is located entirely within the Reactor Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the NMMS scoping boundary is the RWCU System which is separately evaluated as a license renewal system.

Reason for Scope Determination

The Noble Metals Monitoring System does not meet 10 CFR 54.4(a)(1) because it is a non-safety related system and is not relied upon to remain functional during or following a design basis event. It meets 10 CFR 54.4(a)(2) because failure of this non-safety related system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54(a)(1). It does not meet 10 CFR 54.4(a)(3) since it is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The NMMS is located entirely within the Reactor Building and is considered a High Energy Line (HEL). - 10 CFR 54.4(a)(2)

UFSAR References

5.2.3.4

License Renewal Boundary Drawings

LR-GE-148F444

Table 2.3.3.24 Noble Metals Monitoring System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Flow Element	Leakage Boundary
Piping and fittings	Leakage Boundary
Sensor Element	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.24 Noble Metals Monitoring System
-Summary of Aging Management Evaluation

2.3.3.25 Post-Accident Sampling System

System Purpose

The Post-Accident Sampling System (PASS) is designed to obtain liquid and gaseous samples from the primary containment, gaseous samples from the secondary containment, and liquid samples from the reactor vessel for radiological and chemical analysis to determine an estimate of post-accident core damage and coolant corrosivity.

The purpose of the PASS system is to permit collection and processing of liquid and gaseous samples. The PASS system accomplishes its purpose by providing piping to collect these samples during normal and post-accident conditions, and a system to analyze the samples during post-accident conditions. The PASS was originally installed as required by the NRC and as described in NUREG 0737. While no longer required by the Technical Specifications, the PASS system continues to be maintained and operation of the system is described in approved plant procedures.

System Operation

The Post-Accident Sampling System is comprised of piping, tubing, valves, and sample coolers designed to convey the liquid and gaseous samples to the sample station, which consists of the liquid and gas sampling units, instrumentation, controls, fume hood, and displays to accomplish the designed sampling functions.

Reactor coolant samples can be drawn from reactor recirculation Loop A, the Liquid Poison System piping, and the Shutdown Cooling System piping. A torus water sample can be drawn from the Core Spray System piping. The samples pass through sample coolers (cooled by Reactor Building Closed Cooling Water) located in the Reactor Building TIP Room, and continue to the sample station in the PASS room. All liquid samples are returned to the primary containment through the core spray pumps suction line during accident conditions.

Gaseous atmosphere samples can be obtained from the drywell and wetwell through the Hydrogen & Oxygen Monitoring System. A secondary containment atmosphere sample can also be drawn into the PASS station. Primary containment gas samples are returned to the drywell, and secondary containment gas samples are returned to the reactor building atmosphere.

For more detailed information, see UFSAR section 11.5.2.12.

System Boundary

The PASS liquid sample scoping boundary begins with interfaces with Reactor Recirculation System Loop A pump suction piping, the Liquid Poison System supply piping to the reactor vessel, the Shutdown Cooling System return line, and Core Spray System A Loop discharge piping. The sample line from reactor recirculation proceeds through PASS containment isolation valves, and each of these sample lines continues to the sample coolers located in the Reactor Building TIP room and passes through the reactor building wall into the sample station located in the PASS room. The liquid samples are returned to the primary containment through a line from the sample station to the core spray pumps suction line during accident conditions. Included in this boundary are the associated valves, coolers, and instrumentation associated with the PASS piping and analysis system.

The PASS gaseous sample scoping boundary from primary containment begins with interfaces with the Drywell Hydrogen Monitoring System, the Drywell Oxygen Analyzer System, and the Torus Oxygen Analyzer System (all evaluated with the Hydrogen & Oxygen Monitoring System) and continues to the sample station. The primary containment gaseous samples return to the drywell through the discharge line of the containment particulate monitor. Included in this boundary are the valves and components associated with the PASS piping and analysis system. The secondary containment atmosphere sample lines which attach to the sample station through the reactor building wall and return to the TIP room are not included in the scope of license renewal as these gas-filled lines are not liquid- or steam-filled, with no potential for spatial interaction with components performing a safety-related function, and do not themselves support other intended functions.

Included in the license renewal scoping boundary of the PASS are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building. Included in this boundary are liquid-filled pressure retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scope of license renewal is the sample station located in the PASS room of the office building, as this station is physically shielded and does not have the potential for spatial interaction with components performing a safety-related function.

Not included in the scoping boundary of the PASS system are the containment isolation valves that are evaluated with the Hydrogen & Oxygen Monitoring System. Also not included in the scoping boundary of the PASS system are the following interfacing systems, which are separately evaluated as license renewal systems:
Reactor Recirculation System
Standby Liquid Control System (Liquid Poison System)
Shutdown Cooling System
Core Spray System
Hydrogen & Oxygen Monitoring System

Reason for Scope Determination

The Post-Accident Sampling System meets 10 CFR 54.4(a)(1) because it contains safety related components that are relied upon to remain functional during and following design basis events. It also meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets the requirements of 10 CFR 54.4(a)(3) since it is required to demonstrate compliance with the Commission's regulations for environmental qualification (10 CFR 50.49). It is not required to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. Containment isolation valves and containment

sample valves provide ability to close sample lines coming from primary containment. 10 CFR 54.4(a)(1)

2. Provide reactor coolant pressure boundary. Automatic and administratively controlled valves on sample lines from the RCPB maintain the boundary. 10 CFR 54.4(a)(1)
3. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). Sample isolation valve from Liquid Poison system is environmentally qualified. 10 CFR 54.4(a)(3)

UFSAR References

1.9
11.5.2.12

License Renewal Boundary Drawings

LR-BR-M0012
LR-GE-148F723

Table 2.3.3.25 Post-Accident Sampling System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Piping and fittings	Leakage Boundary
	Pressure Boundary
	Structural Support
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in Table 3.3.2.1.25 Post-Accident Sampling System -Summary of Aging Management Evaluation

2.3.3.26 Process Sampling System

System Purpose

The intended function of the Process Sampling System for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, "Guidance on the Identification of Structures, Systems, and Components that meet 10 CFR 54.4(a)(2)", dated March 15, 2002. For this reason, portions of this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and portions of this system are in scope for potential spatial interaction.

The Process Sampling System is designed to permit a representative sample to be taken in a form which can be used in the laboratory and which safeguards against change in the constituents to be examined, minimizes the contamination and radiation at the sample point and reduces decay and sample line plateout as much as possible.

The purpose of the Process Sampling System is to monitor the operation of equipment, and to supply information for making operating decisions where these are influenced by water chemistry. It accomplishes this by collecting steam, gaseous and liquid samples throughout the facility.

The Process Sampling System is comprised of the following subsystems: Reactor Sampling subsystem, Radwaste Sampling subsystem, Composite Sample subsystem, Hydrogen Detection/Sampling subsystem and the Off-Gas Sample subsystem. Sample stream flow rates are selected to maintain turbulent flow for more accurate sampling. All liquid sample lines are provided with means of regulating sample flow and are as short and direct as possible. Piping and sample lines are routed as to avoid crud traps, dead legs and low points. The sample line takeoffs are connected at the side of the process pipe rather than the bottom. Nozzles for liquid sampling are inserted into the process stream to about one fourth of the process pipe diameter for all pipes two inches and larger in diameter. This is to avoid sampling the relatively low velocity fluid near the wall of the pipe. Pipes smaller than two inches are sampled by reducing tees or flush welded tubing.

System Operation

Reactor Sampling Subsystem
The Reactor Sampling subsystem consists of the Reactor Water Sample Station (RWSS) and the Final Feedwater Facility (FFW).

The RWSS provides sample and analysis capabilities for reactor water and the Reactor Water Cleanup System (RWCU). All sample points terminate at the RWSS. The RWSS consists of a wet and a dry section to accommodate both grab sampling and in-line analysis instrumentation respectively. It is equipped with a splash guard sash and an exhaust fume hood. RWCU filter influent sample is taken from the filter inlet pipe to monitor reactor water quality. Filter effluent sample is taken at the filter outlet pipe for filter efficiency. Demineralized effluent sample is taken at the pump discharge pipe for demineralizer efficiency. A reactor water sample sink with a laboratory type hood and a demineralized water supply is provided for a continuous flowing reactor water cleanup filter inlet sample.

The FFW system consists of sampling of the turbine building primary systems. These systems include feedwater, condensate water and condensate demineralizer effluent. All sample points terminate at either the FFW sample sink or the condensate sample sink. The FFW provides sample and analysis capabilities for the final feedwater. Whenever necessary, sample coolers and valves for manual pressure reduction are provided. The FFW consists of in-line sample and analysis equipment. Grab sampling is done at both the feedwater and condensate sample sinks. Samples of the Feedwater System are taken at the sample sink located at the north wall of the feedwater pump room. Filter samples of feedwater, inline conductivity and dissolved oxygen are taken at the FFW sample console located to the right side of the feedwater pump room sample sink. Condensate is sampled at two points. One sample point is on the common header pipe just downstream of the tie-in from "C" condensate pump. The sample line extends from this sample point to the sample sink located on the north end of the feed pump room. Additionally there is a sample point at the inlet to the condensate demineralizers. The sample line extends to the sample sink on the south side of the Turbine Building Condensate Demineralizer Control Room. Condensate demineralizer effluent samples are taken from the demineralizer effluent header. Individual demineralizer bed effluent samples are taken from effluent conductivity instruments. The condensate sample sink is located at the south end of the Turbine Building Condensate Demineralizer Control Room.

This subsystem is not required to operate to support license renewal intended functions, but is included in the scope of license renewal as this liquid filled subsystem is located within an area in proximity of components performing a safety related function. Portions of this system are located in the Reactor and Turbine Buildings.

Radwaste Sampling Subsystem
The Radwaste Sampling subsystem monitors activity at various points of the Radwaste System which is a liquid and solid radioactive waste management system.

This subsystem is not required to operate to support license renewal intended functions, and is not included in the scope of license renewal as this liquid filled subsystem is not located within an area in proximity of components performing a safety related function. Portions of this system are located in the New Radwaste and Old Radwaste Buildings.

Composite Sample Subsystem
Composite samples of condenser cooling water are taken locally at the plant's intake and outfall. The outfall sampler is located at such a point that good mixing is ensured for the outflow. An influent sample is taken at the inlet to the closed cooling water heat exchanger in order to determine background. An effluent sample is taken as the discharge structure in order to monitor plant activity release.

This subsystem is not required to operate to support license renewal intended functions, and is not included in the scope of license renewal as this liquid filled subsystem is not located within an area in proximity of components performing a safety related function.

Hydrogen Detection/Sampling Subsystem
The Hydrogen Detection/Sampling subsystem monitors the Augmented Off Gas Recombiner

Subsystem. Hydrogen analyzers are located before and after the recombiners to monitor recombiner performance and to ensure that the hydrogen concentration is maintained below the flammable limit of 4% by volume.

This subsystem is not required to operate to support license renewal intended functions. Portions of this system are located in the Turbine Building, however they are not included in the scope of license renewal as this subsystem is gas filled and is not liquid or steam filled.

Off-Gas Sample Subsystem
The Off-Gas subsystem takes a sample after the air ejectors to measure activity release and H2O2 and air leakage, a sample at the stack to measure particulate and iodine release, and a sample at the inlet and outlet of the offgas filter to determine filter efficiency.

This subsystem is not required to operate to support license renewal intended functions. Portions of this system are located in the Turbine Building, however they are not included in the scope of license renewal as this subsystem is gas filled and is not liquid or steam filled.

For more detailed information, see UFSAR Section 9.3.2.

<u>System Boundary</u>

The license renewal scoping boundary of the Process Sampling System encompasses the liquid filled portions of the system that are located in proximity to equipment performing a safety-related function. This includes the liquid filled portions of the Reactor Sampling subsystem located within the Reactor Building and Turbine Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Components and subsystems that are not required to support the system's leakage boundary intended function are not included in the scope of license renewal. This includes the Radwaste Sampling subsystem, Composite Sample subsystem, Hydrogen Detection/Sampling subsystem and Off-Gas Sample subsystem.

Not included in the Process Sampling System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Feedwater System
Condensate System
Turbine Building Closed Cooling Water System
Reactor Building Closed Cooling Water System
Reactor Water Cleanup System
Offgas Building Ventilation System
Radwaste Systems
Circulating Water System
Demineralized Water System

<u>Reason for Scope Determination</u>

The Process Sampling system is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The Process Sampling system is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The Process Sampling System has the potential for spatial interaction with safety related equipment located in the vicinity to water filled process sampling piping. 10 CFR 54.4(a)(2)

UFSAR References

9.3.2
Table 9.3-3

License Renewal Boundary Drawings

LR-GU-3E-551-21-1001
LR-GU-3E-551-21-1000
LR-GE-148F444
LR-BR-2003
LR-BR-2002 sheet 2
LR-BR-2004 sheet 1
LR-BR-M0012

Table 2.3.3.26 Process Sampling System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Coolers	Leakage Boundary
Evaporator	Leakage Boundary
Flexible Hose	Leakage Boundary
Flow Element	Leakage Boundary
Piping and fittings	Leakage Boundary
Pump Casing	Leakage Boundary
Sensor Element	Leakage Boundary
Sight Glasses	Leakage Boundary
Tanks (Reservoir)	Leakage Boundary
Thermowell	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.26 Process Sampling System
-Summary of Aging Management Evaluation

2.3.3.27 Radiation Monitoring System

System Purpose

The Radiation Monitoring System is in scope for License Renewal. However, major portions of the system are not required to perform intended functions and are not in scope.

The Radiation Monitoring System is a system that utilizes radiation detectors to assess overall plant radiological conditions at the facility.

The purpose of the Radiation Monitoring System is to detect the release of radioactivity, monitor radiation levels in key locations throughout the plant, and monitor radioactivity concentration levels of major process system discharge streams.

The system accomplishes the purpose by utilizing radiation detectors and associated circuitry to monitor and indicate radiation levels.

The Radiation Monitoring system consists of Process and Effluent Radiological Monitoring, Area Radiation and Airborne Radioactivity Monitoring and Containment Atmosphere Particulate and Gaseous Radioactivity Monitoring (CAPGRMS).

The Process and Effluent Radiological Monitoring System consists of Main Steam Line Monitoring, Process Liquid Monitoring, Air Ejector Offgas Monitoring, Stack Radioactive Gaseous Effluent Monitoring (RAGEMS), Turbine Building RAGEMS, Domestic Sewer Effluent Monitor, and Augmented Offgas Building Ventilation Monitor. Process Liquid Monitoring is comprised of the reactor building closed cooling water monitor, the service water radiation monitor and the turbine building sump radiation monitor.

Most process and effluent monitors utilize radiation detectors located in proximity to the process piping being monitored, but some utilize sample piping to deliver a sample to a monitoring station. The service water radiation monitor is an offline radiation monitor on an enclosed skid located outside the Reactor Building. The sample piping to and from the service water radiation monitor is not included in this scoping evaluation, and is evaluated separately for license renewal with the Service Water System. Similarly, the Air Ejector Offgas Monitor sample piping is not included in this scoping evaluation, and is evaluated separately for license renewal with the Main Condenser Air Extraction System. The Augmented Offgas Building Ventilation Monitor sample piping is not included in this scoping evaluation, and is evaluated separately for license renewal with the Radwaste Area Heating and Ventilation System.

The Stack and Turbine Building RAGEMS include sample piping that deliver the gas samples to monitoring stations. These monitors ensure that plant releases do not exceed the limits specified in 10 CFR 20 and 10 CFR 50 Appendix I. These monitors do not support a license renewal intended function, and are not included in the scope of license renewal. The RAGEMS sample piping is not required to support a safety related pressure boundary, does not support a license renewal intended function, and so is also not included in the scope of license renewal.

The Area Radiation and Airborne Radioactivity Monitoring system consists of In Plant and Refueling Area Monitors, Augmented Offgas Building Area Monitors, New Radioactive Waste

Building Area Monitors and Reactor Building Ventilation Monitors.

The Containment Atmosphere Particulate and Gaseous Radioactivity Monitor System provides a diverse means of reactor coolant system leak detection by detecting the release of radioactivity from a leak and subsequent flashing to steam. The system is designed to detect both particulate and noble gas radiation. The CAPGRMS system draws a sample of the containment atmosphere from the Hydrogen and Oxygen Monitoring System. The sample is returned to the torus. The return line to the torus includes solenoid operated containment isolation valves

System Operation

The CAPGRMS system monitors the primary containment by drawing a containment atmosphere sample from the Hydrogen and Oxygen Monitoring System, which also draws a sample from the containment. The sample is drawn through the CAPGRMS monitoring station by an air sample pump. The sample is returned to the torus through two solenoid operated containment isolation valves.

The CAPGRMS continuously samples containment atmosphere for a fixed period and measures the activity levels for both particulates and noble gases. The measured count rates are compared to expected values stored in the CAPGRMS microprocessor. The CAPGRMS activates a Control Room annunciator when either the particulate or noble gas channel activity increases at a rate that exceeds the expected increase from a previous sample period, or exceeds a pre-established setpoint for either channel. The CAPGRMS is equipped with Control Room annunciation of system malfunction.

The Process and Effluent Radiological Monitoring System includes radiation monitors to provide indication, alarm, and in some cases, automatic control functions. Monitors that initiate isolation valve closure or plant shutdown are designed so that a single component failure does not prevent the required automatic action. All monitors are capable of self-supervision, i.e., give an alarm when downscale or de-energized. For monitoring configurations using offline sampling, alarms are also provided to give warning if the sampling flow is low. All monitors are capable of convenient, operational verification by means of test signals or radioactive check sources.

The Process and Effluent Radiological Monitoring System is designed to detect radioactive gaseous and liquid leakage, provide warning and automatic control as appropriate when radioactivity in a process stream reaches a preset limit, provide information on fuel and radioactive processing equipment performance, provide a record of radioactivity present in various plant systems, and provide a record of radioactivity released to the environment to assure compliance with regulatory limits. These monitors continuously measure, indicate, and record the radioactivity concentration levels of major process system discharge streams. The monitors are set to alarm when concentrations vary significantly from normal levels.

The Main Steam Line Monitoring subsystem is provided for continuous monitoring of each main steam line to permit the prompt indication of gross release of fission products from the fuel to the reactor coolant. Main steam line high radiation is an indication of excessive fuel failure. The Process Liquid Monitor subsystem is provided to monitor the radioactivity concentration levels of the major liquid process discharge streams, and to provide an alarm when concentration levels vary significantly from normal levels. The Domestic Sewer Monitor is provided to measure radiation level in the domestic sewer prior to discharge from the plant.

This monitor will initiate an alarm, and will also trip the sewer lift pump.

The Area Radiation and Airborne Radioactivity Monitoring system is designed to monitor the level of radiation in areas where personnel access may be required, assist in maintaining occupational radiation exposures as low as reasonably achievable, alarm when radiation levels exceed preset limits, and provide a continuous record of radiation levels in key locations throughout the plant.

The In Plant and Refueling Area monitors include thirty-two points of area monitoring, sufficient to insure that no plant areas where personnel are likely to work for prolonged periods of time are left unmonitored. The radiation monitors consist of gamma sensitive Geiger Mueller detectors or ion chamber detectors. All but three monitors are linked to a readout, power supply, and recorder located in the Main Control Room. Two refueling bridge monitors and one monitor located in the Chemistry Lab Post-Accident Sampling System (PASS) Room are for local alarm and indication only. Only two of the area monitors have automatic functions. Following a high alarm at the Spent Fuel Storage Pool low range monitor or the Reactor Building Equipment Hatch monitor, a two-minute timer is started. If the alarm has not cleared in two minutes, the Reactor Building normal ventilation is secured and the Standby Gas Treatment System is initiated.

The Augmented Offgas Building Area Monitors consist of four channels, each comprised of a detector, an alarm and meter module, and a readout module. The New Radioactive Waste Building Area Monitors consist of twenty channels, each comprised of a detector, an alarm and meter module, and a readout module. Both subsystems employ identical components. Each detector assembly consists of a dual air filled ion chamber and a preamplifier in a cylindrical wall mounted container. Each readout module receives and conditions the amplified output from the associated detector assembly for distribution to alert and high trip units, and to a logarithmic ratemeter. The alarm and meter modules provide local indication and annunciation.

Readout modules for the Augmented Offgas Building Area Monitoring channels are located in the Augmented Offgas Control Room. Output from the alert and high trip circuits also supply alert and high radiation indicator mounted at the stairwell entrance to the Augmented Offgas Building to warn personnel on entering of high radiation levels. Readout modules for the New Radwaste Building are located on the Radwaste Control Panel.

Reactor Building Ventilation Monitors provide continuous monitoring so that appropriate action can be taken if the radiation level is excessive. Two gross gamma detectors are located in the Reactor Building exhaust plenum upstream of the building ventilation system exhaust valve. The detectors are GM tubes identical to those used for area radiation monitoring. When either of the two detectors indicates a radioactivity level above the high alarm setpoint, a high radiation alarm is given in the Control Room. The Reactor Building Ventilation System isolation valves close automatically, and the exhaust is diverted to the Standby Gas Treatment System prior to release to the plant ventilation stack.

For more detailed information about the Radiation Monitoring System, see UFSAR Section 11.5, 12.3.4 and 5.2.5.1.3.

<u>System Boundary</u>

The majority of the Radiation Monitoring System consists of radiation detectors and associated circuitry, and a boundary description for a mechanical system is not applicable since these components are evaluated as an electrical commodity. Some portions of the system utilize sample piping to direct samples to monitoring stations. Most of the sample piping is either included within the associated process system license renewal evaluation boundary as described above, or is not included in the scope of license renewal. The only sample piping in the Radiation Monitoring System that is included in the scope of license renewal is associated with the CAPGRMS system.

The boundary of the CAPGRMS system begins at the attachment point to the Hydrogen and Oxygen Monitoring System. It continues through the CAPGRMS monitoring station through an air sample pump and then returns to the torus through two solenoid operated containment isolation valves and sample return piping to the connection with the torus shell. The CAPGRMS boundary includes all associated piping, components and instrumentation in the sample flowpath described above.

The portion of the CAPGRMS sample flowpath from the attachment point to the Hydrogen and Oxygen Monitoring System through the CAPGRMS monitoring station and sample return piping and components to the outer containment isolation valves are not required to perform a safety related intended function. Portions of this piping are included in the scope of license renewal for physical interaction as described below.

The CAPGRMS supports the primary containment isolation intended function. This portion of the CAPGRMS starts at the outer containment isolation valve and continues to the connection with the torus shell, and includes all associated piping and valves.

Included in the license renewal scoping boundary of the Radiation Monitoring System are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor. The interface is located where the CAPGRMS sample return piping connects to the outer containment isolation valve. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the Radiation Monitoring system license renewal scoping evaluation boundary are the following systems, which are separately evaluated as license renewal systems:

Reactor Building Ventilation System
Standby Gas Treatment System
Hydrogen and Oxygen Monitoring System

<u>Reason for Scope Determination</u>

The Radiation Monitoring System is in scope under 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The Radiation Monitoring System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. Reactor Building Ventilation System trip and isolation, and Standby Gas Treatment System initiation, on high radiation in reactor building ventilation exhaust, refuel platform or spent fuel pool area. 10 CFR 54.4 (a)(1)
2. Provide primary containment boundary. Sample return piping to torus and associated containment isolation valves provide a primary containment boundary. 10 CFR 54.4 (a)(1)
3. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. Non-safety related Radiation Monitoring System piping is attached and provides physical support to the safety related containment boundary piping. 10 CFR 54.4(a)(2)

UFSAR References

5.2.5.1.3
11.5
12.3.4

License Renewal Boundary Drawings

LR-GU-3E-666-21-1000

Table 2.3.3.27 Radiation Monitoring System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Piping and fittings	Pressure Boundary
	Structural Support
Valve Body	Pressure Boundary
	Structural Support

The aging management review results for these components are provided in
Table 3.3.2.1.27 Radiation Monitoring System
-Summary of Aging Management Evaluation

2.3.3.28 Radwaste Area Heating and Ventilation System

System Purpose

The Radwaste Area Heating and Ventilation System is in scope for License Renewal. However, major portions of the system are not required to perform intended functions and are not in scope.

The Radwaste Area Heating and Ventilation System is a normally operating mechanical ventilation system to the radwaste areas of the plant which include the Old Radwaste (ORW) Building, the New Radwaste (NRW) Building, the NRW Heat Exchanger Building, the Offgas Building, and the Hot Machine Shop in the New Maintenance Building.

The purpose of the Radwaste Area Heating and Ventilation System is to provide ventilation, heating and cooling to control area temperatures, to control air movement from low contamination areas to high contamination areas and to provide means for filtering and monitoring the exhaust air before discharging to atmosphere. It accomplishes this by means of five independent HVAC systems, incorporating the necessary fans, filters and ducting to accommodate the individual requirements of the processes contained within each of the five buildings.

The radiological design objectives of the Radwaste Area Heating and Ventilation System is to limit the average in-plant airborne radioactivity levels below the guideline limits in 10 CFR 20 and to reduce offsite releases of radioactivity to as low as reasonably achievable levels (10 CFR 50 App I). The system is not required to provide ventilation to support license renewal intended functions, but is in scope to support the pressure boundary integrity of the Ventilation Stack in meeting 10 CFR 100 limits. The ventilation exhaust ducts from the New and Old Radwaste Buildings connect to the Ventilation Stack and support the stack function of providing an elevated release path because they maintain their pressure boundary integrity to prevent the backflow of gas effluents and unmonitored release to the environment.

System Operation

The Radwaste Area Heating and Ventilation System comprises independent ventilation equipment in the following five buildings:

New Radwaste Building

The ventilation system for the NRW Building includes a supply system and an exhaust system. The supply system is comprised of one axial fan, associated ductwork, controls, heating coils and filters. The supply fan is sized to handle 100 percent fresh air with no recirculation and is filtered by fully automatic roll-up type filters and intermediate filters.

The exhaust system is comprised of two axial fans in the building, two axial fans on the roof, an isolation damper, a filter train and associated ductwork. The exhaust fans are each redundant and are sized to handle 100 percent of the exhaust air with no recirculation.

The exhaust filter train is sized to handle 100 percent exhaust air and consists of a roughing filter and a HEPA filter located directly upstream of the exhaust fans. After the air is filtered and discharged from the building, the exhaust booster fans transfer the air to the stack, where it is monitored for radioactivity and exhausted. A bypass ductwork arrangement is designed into the exhaust unit (filter train) to allow constant exhaust air flow during maintenance or replacement of filters.

An automatically operated isolation damper, located downstream of the booster exhaust fans on the roof, completely isolates the exhaust system from the outside environment during shutdown conditions, thus preventing backflow to the NRW Building from the Ventilation Stack.

The NRW Building Control Room, which is normally occupied, is air-conditioned using a minimum fresh air design. This room is sealed from adjacent areas and maintained at a positive pressure with respect to the adjacent building areas, which are under a slightly negative pressure. This design will allow only air leakage from the local Control Room to the adjacent areas at all times.

The NRW Building Control Room air conditioning system consists of a floor mounted package unit, located in the change room, and its associated ductwork extended to the single zone Control Room. The package unit is provided with an economizer cycle and low pressure steam coils for winter heating.

NRW Heat Exchanger Building

The Heat Exchanger Building is adjacent to the NRW Building. Temperatures and ventilation levels for this building are maintained by once-through outside air ventilation comprised of a wall exhaust fan and interconnected wall thermostat. A low-pressure steam unit heater provides heating.

Old Radwaste Building

The ORW Building ventilating system is comprised of two exhaust fans, two filter banks and discharges to the stack. The supply fans and air washer have been removed from service and abandoned in place. In normal operation one exhaust fan will be on. The alternate fan will be off and its respective inlet damper will be closed. An interlock is provided for the exhaust fans so that if the operating fan stops the other will start automatically. The Ventilation Stack pressure boundary is thus maintained whether the Old Radwaste Building exhaust fans are running or shut down with closed dampers. The exhaust fans have inlet vanes which are locked in an open position to hold the static pressure in the building at a negative 0.25 inches WG or greater. Heating is supplied by means of electric heating units throughout the building.

All exhaust air is filtered before release. Absolute filters remove small particles (0.3 microns or larger), and roughing filters upstream of the absolute filters remove large particles. The filters are arranged in two parallel banks, each with an air operated, manually controlled valve in the outlet.

Offgas Building

The Offgas Building Heating and Ventilation System is a push-pull heating and ventilation system providing once-through air flow with no recirculation. It is comprised of a supply air system and an exhaust air system, which discharges through a louver in the north wall of the building. The supply air system consists of one full capacity centrifugal fan in a cabinet together with an electric heating coil and prefilter. The prefilter is the renewable roll type and is automatically advanced to maintain a uniform pressure drop. The heating unit is a staged electric heater.

Sheet metal ducts are arranged to take outside air and deliver it to the various spaces within the building in proportion to the ventilation air in accordance with space requirements. An additional electric booster heating coil is provided in each of the three branches of the supply air system. This allows different temperatures to be selected for each zone.

The exhaust air system includes one full capacity air mover assembly, consisting of a cabinet containing a centrifugal fan together with a prefilter and final filter (HEPA). The prefilter is of the renewable roll type and is automatically advanced to maintain uniform pressure drop. The final filter is a replaceable high efficiency (99.97 percent) unit.

New Maintenance Building

The ventilation equipment for the New Maintenance Building is comprised primarily of 13 exhaust fans and associated ductwork providing ventilation of the individual rooms, unit & wall heaters and self contained a/c units. Four of the exhaust fans with filtered exhaust serve the Hot Machine Shop room of the New Maintenance Building. The remaining rooms of the New Maintenance Building are clean and discharges are not filtered.

The room exhaust for the Hot Machine Shop consist of two parallel trains with an intake isolation damper and pre and HEPA filters directly upstream of each exhaust fan. The fans then exhaust to the atmosphere. Two additional exhaust fans are provided, one being a fume exhauster. They both discharge to ductwork connected to the intake of one of the room exhaust thus being filtered prior to discharge.

For more detailed information, see UFSAR Section(s) 9.4.4 & 12.3.3.

<u>System Boundary</u>

The boundary of the Radwaste Area Heating and Ventilation System includes the supply and exhaust ventilation systems of the New Radwaste Building (NRW), the NRW Heat Exchanger Building, the Old Radwaste Building, the Offgas Building and the New Maintenance Building.

Not included in the license renewal scoping boundary are the following connected systems, which are separately evaluated as license renewal systems.
Instrument Air System
Heating & Process Steam System

The ventilation and pressure boundary integrity of the NRW Heat Exchanger Building, the Offgas Building and the New Maintenance Building are not required to support intended functions. This portion of the Radwaste Area Heating and Ventilation System is not included within the scope of license renewal.

The New and Old Radwaste Buildings exhaust ventilation ducts support the Ventilation Stack boundary intended function. The only portion of the Radwaste Area Heating and Ventilation System in scope of license renewal consists of the NRW Building exhaust duct from the isolation damper to the connection with the Reactor Building ventilation exhaust duct and the

Old Radwaste Building exhaust duct from the exhaust fan inlet isolation dampers to the connection with the Ventilation Stack. Not included in the scoping boundary of the Radwaste Area Heating and Ventilation System is the Reactor Building exhaust duct and the Ventilation Stack which are evaluated with the Reactor Building Ventilation System and Ventilation Stack Structure respectively for license renewal scoping.

Reason for Scope Determination

The Radwaste Area Heating and Ventilation System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The Radwaste Area Heating and Ventilation System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2) (The New and Old Radwaste Buildings outdoor exhaust ducts connect to and support the Ventilation Stack boundary and are required to maintain their pressure boundary integrity to prevent the backflow of gas effluents and unmonitored releases to the environment.)

UFSAR References

9.4.4
12.3.3

License Renewal Boundary Drawings

LR-BR-2012
LR-BR-2009 sheet 2

Table 2.3.3.28 Radwaste Area Heating and Ventilation System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Damper housing	Pressure Boundary
Door Seal	Pressure Boundary
Ductwork	Pressure Boundary
Fan Housing	Pressure Boundary
Flexible Connection	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.28 Radwaste Area Heating and Ventilation System
-Summary of Aging Management Evaluation

2.3.3.29 Reactor Building Closed Cooling Water System

System Purpose

The Reactor Building Closed Cooling Water (RBCCW) System is a closed-loop system designed to provide inhibited demineralized cooling water to Reactor Building and Primary Containment equipment that is subject to radioactive contamination. Included in the RBCCW System is a corrosion inhibiting chemical treatment system designed for intermittent injection of a chemical solution into the demineralized water contained within the system.

The purpose of the RBCCW System is to remove heat from the following loads during various modes of reactor operation: Spent Fuel Pool Cooling System (Fuel Pool Cooling Heat Exchangers and Augmented Fuel Pool Cooling Heat Exchanger), Shutdown Cooling System (Shutdown Cooling Heat Exchangers and Shutdown Cooling Pumps), Reactor Water Cleanup System (Cleanup Non-Regenerative Heat Exchangers, Cleanup Recirc. Pump Coolers, Cleanup Auxiliary Pump Coolers, and Cleanup Pre-Coat Pump Cooler), Reactor Building Ventilation System (Tunnel Coolers, Core Spray Pump Room Coolers, Containment Spray Pump Room Coolers), Reactor Building Floor and Equipment Drain System (Reactor Building Equipment Drain Tank Cooler), Drywell Cooling System (Drywell Cooling Units), Reactor Recirculation System (Recirc. Pump Seal and Motor Coolers), Post Accident Sampling System (Post Accident Sample Coolers), Process Sampling System (Reactor Water Sample Station Coolers, Thermal Control Unit Condenser, miscellaneous sample coolers), and Drywell Floor and Equipment Drain System (Drywell Equipment Drain Tank Heat Exchanger). The RBCCW System accomplishes this by transferring heat from these loads to the Service Water System through the RBCCW heat exchangers. Flow and temperature control is achieved through manual/remote manual manipulation of RBCCW System valves.

System Operation

The RBCCW System is comprised of pumps, heat exchangers, chemical addition equipment, a surge tank, and necessary controls and support equipment. Two half capacity RBCCW pumps discharge to a common header which branches into the two half capacity RBCCW heat exchangers. Cooling water from the RBCCW heat exchangers flows to a common header and is distributed in parallel to the components cooled by the RBCCW System. Cooling water from the equipment being cooled flows into a common return header and is routed to the pump's suction. A bypass line is provided from the RBCCW pump discharge header to the heat exchanger discharge header to compensate for fluctuations in service water temperature.

A surge tank is provided at the high point of the system and is sized to hold the expected maximum expansion of the RBCCW System. Makeup to the surge tank from the Demineralized Water Transfer System can be added manually or by an automatic level control valve. Makeup flowrate is monitored and recorded to provide an indication of RBCCW System leakage.

The chemical treatment system is comprised of a mixing tank and a chemical feed pump. Water is drawn from the discharge header of the RBCCW pumps and the solution is injected upstream of the pumps in the common pump suction header.

The RBCCW System penetrates the Primary Containment at two points to provide cooling to the Reactor Recirculation Pump seal and motor coolers, Drywell Equipment Drain Tank Heat

Exchanger, and the Drywell Cooling System fan unit cooling coils. RBCCW flow enters the Primary Containment through one motor operated and one check valve in series and exits the Primary Containment through two motor operated valves in series. The motor operated containment isolation valves automatically close when coincident reactor vessel low low level and drywell high pressure signals are present (LOCA signal) or when a reactor vessel triple low level signal is present. Deliberate operator action is required to reopen these isolation valves.

A safety injection signal (reactor vessel low low level or drywell high pressure) trips the RBCCW pumps. Then, during operation from the Emergency Diesel Generators, both RBCCW pumps start automatically after a time delay, unless a LOCA signal is present. Both RBCCW heat exchangers remain in service. One, two, or three shutdown cooling heat exchangers may be started up manually, depending on the total heat load on the system. RBCCW room cooling for Core Spray and Containment Spray equipment is not required for long term operation of these systems post LOCA.

The RBCCW System acts as a buffer between radioactively contaminated systems, which it cools, and the Service Water System, which is the heat sink for the RBCCW System. Process Liquid Monitoring (evaluated with the Radiation Monitoring System) is provided for the RBCCW System to continuously measure, indicate, and record the radioactivity concentration levels at the discharge header of the RBCCW heat exchangers.

For additional information, see UFSAR Section 9.2.2.

System Boundary

The RBCCW System boundary begins at the RBCCW System pumps and continues through the shell side of the RBCCW heat exchangers and through all the cooled loads (Fuel Pool Cooling Heat Exchangers, Augmented Fuel Pool Cooling Heat Exchanger, Shutdown Cooling Heat Exchangers, Shutdown Cooling Pumps, Cleanup Non-Regenerative Heat Exchangers, Cleanup Recirc. Pump Coolers, Cleanup Auxiliary Pump Coolers, Cleanup Pre-Coat Pump Cooler, Tunnel Coolers, Core Spray Pump Room Coolers, Containment Spray Pump Room Coolers, Reactor Building Equipment Drain Tank Cooler, Drywell Cooling Units, Reactor Recirculation Pump Seal and Motor Coolers, Post Accident Sample Coolers, Process Sampling Coolers and Condensers, and Drywell Equipment Drain Tank Heat Exchanger). The boundary continues from the cooled loads back to the suction of the RBCCW System pumps. Included in the boundary are the RBCCW System Primary Containment isolation valves, the RBCCW surge tank, and the RBCCW System chemical treatment equipment. All associated piping, components, and instrumentation contained within the flowpath described above are also included in the RBCCW System boundary.

Included in the license renewal boundary of the RBCCW System are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building and Primary Containment. Also included in the boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this portion of the system. Not included in the scope of license renewal for leakage boundary are the Reactor Recirc. Pump Seal Cooler, Reactor Recirc. Pump Motor Cooler, Reactor Building Equipment Drain Tank Cooler, Reactor Water Sample Station Coolers, and Thermal Control Unit Condenser. These coolers are internal to components or enclosed panels and do not create the potential for spatial interaction (leakage or spray) with safety related equipment. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the RBCCW System license renewal scoping boundary are the following systems, which are separately evaluated as license renewal system:

Spent Fuel Pool Cooling System
Shutdown Cooling System
Reactor Water Cleanup System
Reactor Building Ventilation System
Reactor Building Floor and Equipment Drain System
Drywell Cooling System
Reactor Recirculation System
Post Accident Sampling System
Process Sampling System
Drywell Floor and Equipment Drain System
Water Treatment & Distribution System
Radiation Monitoring System

The RBCCW System supports the Primary Containment Boundary intended function. This portion of the system includes the RBCCW supply and return inboard and outboard containment isolation valves and interconnecting piping. The motor operated containment isolation valves are environmentally qualified and support the Environmental Qualification intended function.

The RBCCW System supports the Spent Fuel Pool Cooling System in ensuring adequate cooling in the spent fuel pool to maintain stored fuel within acceptable temperature limits. This portion of the system includes that which must remain operational and pressurized to provide cooling water to the Fuel Pool Cooling and Augmented Fuel Pool Cooling Heat Exchangers. It includes the RBCCW pumps, heat exchangers, and piping and valves associated with establishing this flowpath. It also includes the RBCCW System surge tank and associated piping and components since these must operate in order to compensate for thermal expansion and monitor for system leakage. It does not include the RBCCW System chemical treatment equipment since this equipment operates intermittently and is not necessary for RBCCW System support of this intended function.

The RBCCW System supports the Fire Protection intended function. This portion of the system includes that which must remain operational and pressurized to provide cooling water to the Shutdown Cooling System heat exchangers and pumps. It includes the RBCCW pumps, heat exchangers, and piping and valves associated with establishing this flowpath. It also includes the RBCCW System surge tank and associated piping and components since these must operate in order to compensate for thermal expansion and monitor for system leakage. It does not include the RBCCW System chemical treatment equipment since this equipment operates intermittently and is not necessary for RBCCW System support of this intended function.

Reason for Scope Determination

The Reactor Building Closed Cooling Water System meets 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The Reactor Building Closed Cooling Water System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Building Closed Cooling Water System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Environmental Qualification (10 CFR 50.49). The Reactor Building Closed Cooling Water System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. The RBCCW System includes Primary Containment isolation valves that close to prevent the release of radioactive contamination through system lines. - 10 CFR 54.4(a)(1)
2. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The RBCCW System provides cooling to the Fuel Pool Cooling and Augmented Fuel Pool Cooling Heat Exchangers to ensure that stored fuel is maintained within acceptable temperature limits. The RBCCW System contains non-safety related water filled lines throughout the Primary Containment and the Reactor Building which have spatial interactions (spray or leakage) with safety related SSCs. - 10 CFR 54.4(a)(2)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The RBCCW System is credited for supporting the Shutdown Cooling System (SDC). - 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). The Primary Containment isolation valves within the RBCCW System are Environmentally Qualified. - 10 CFR 54.4(a)(3)

UFSAR References

3.1
9.2
7.3
Table 6.2-12

License Renewal Boundary Drawings

LR-BR-2006 sheet 1
LR-BR-2006 sheet 2
LR-BR-2006 sheet 3
LR-BR-2006 sheet 5
LR-BR-2006 sheet 7
LR-GU-3E-551-21-1001
LR-GE-148F444

LR-BR-M0012
LR-GE-107C5339
LR-JC-147434 sheet 2

Table 2.3.3.29 Reactor Building Closed Cooling Water System Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Coolers (Cleanup Auxiliary Pump)	Leakage Boundary
Coolers (Cleanup Pre-coat Pump)	Leakage Boundary
Coolers (Cleanup Recirc. Pumps Lube Oil)	Leakage Boundary
Coolers (Containment Spray Pump Room)	Leakage Boundary
Coolers (Core Spray Pump Room)	Leakage Boundary
Coolers (Drywell Cooling Units)	Leakage Boundary
Coolers (Post Accident Sample)	Leakage Boundary
Coolers (Sample)	Leakage Boundary
Coolers (Shutdown Cooling Pumps)	Heat Transfer
	Pressure Boundary
Coolers (Tunnel)	Leakage Boundary
Filter Housing	Leakage Boundary
Flow Element	Pressure Boundary
Gauge Snubber	Leakage Boundary
	Pressure Boundary
Heat Exchangers (Augmented Fuel Pool Cooling)	Heat Transfer
	Pressure Boundary
	Structural Support
Heat Exchangers (Cleanup Non-Regenerative)	Leakage Boundary
Heat Exchangers (Drywell Equipment Drain Tank)	Leakage Boundary
	Structural Support
Heat Exchangers (Fuel Pool Cooling)	Heat Transfer
	Pressure Boundary
Heat Exchangers (Shutdown Cooling)	Heat Transfer
	Pressure Boundary
Level Glass	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (Chemical Feed Pump)	Leakage Boundary
Pump Casing (RBCCW Pumps)	Pressure Boundary
Rupture Disks	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks (Chemical Mixing Tank)	Leakage Boundary
Tanks (RBCCW Surge Tank)	Pressure Boundary

Thermowell	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.29 Reactor Building Closed Cooling Water System -Summary of Aging Management Evaluation

2.3.3.30 Reactor Building Floor and Equipment Drains

System Purpose

Reactor Building Floor and Equipment Drains (RFED) are comprised of both gravity and pumped fluid lines designed to provide collection of drainage from floor drains and equipment drains located in the Reactor Building structure outside of the primary containment, and subsequent transfer of the drainage to the Radwaste System.

The purpose of the RFED is to provide for collection of floor drains and equipment drains located in the Reactor Building outside of the primary containment, and to transfer the collected drainage to the Radwaste System for processing. The RFED accomplish this purpose by directing floor drains first to the Torus room and then to one of two sumps in the Reactor Building basement, and directing equipment drains through a ring header to the Reactor Building Equipment Drain Tank. The Reactor Building Floor Drain Sump – A (1-6 floor drain sump) in the Reactor Building basement drains by gravity to the Reactor Building Floor Drain Sump – B (1-7 floor drain sump), which uses duplex, 100 percent capacity pumps to transfer the collected drainage to Radwaste System collection tanks for processing. A single pump transfers drainage from the Reactor Building Equipment Drain Tank to the Radwaste System collection tanks.

System Operation

The RFED are comprised of drain lines that begin at various floor drains and equipment drain funnels located throughout the Reactor Building. The floor drain lines are directed into the Torus room, and then into either the 1-6 or 1-7 floor drain sump in the Reactor Building basement. Check valves are located in the floor drains of the NW and SW corner rooms, which allow drain flow from the corner rooms into the Torus room but prevent flooding of the corner rooms from the Torus room. Air operated isolation valves are located in the lines to the 1-6 and 1-7 floor drain sumps, which close on high-high 1-7 floor drain sump level. These valves isolate the sumps from the Torus room, which prevents flooding the NE and SE corner rooms where the sumps are located. The 1-6 floor drain sump gravity drains to the 1-7 floor drain sump through a crosstie header, which has air operated valves located on either end. These valves also close on high-high 1-7 floor drain sump level to isolate the 1-6 and 1-7 floor drain sumps. Duplex pumps transfer the 1-7 sump contents to the Chemical Waste Floor Drain Collection Tanks (evaluated with the Radwaste System).

Equipment drain lines are collected by a ring header located below the Reactor Building first floor and drained to the Reactor Building Equipment Drain Tank. This tank also collects water from the scram discharge headers after a scram is reset. The tank is vented to the stack through ventilation ducts. One pump transfers the drainage from the tank to either of the high purity waste collection tanks in the Radwaste System. The equipment drain tank, drain tank pump, and sump pumps are controlled from the radwaste control panel.

The floor drain from the cask decontamination area empties into the laundry drain tank (evaluated with the Miscellaneous Floor and Equipment Drain Systems).

Each level of the Reactor Building with the exception of El. 119’ is equipped with sufficient floor drainage capability to pass the maximum credible floor drain flow rate resulting from actuation of the Fire Suppression System or a pipe break. Elevation 119’ does not require a floor drain network, as stairwells and equipment storage pools are sufficient to prevent flooding of this area.

For more detailed information, see UFSAR section 9.3.3.

System Boundary

The license renewal scoping boundary of the RFED begins with the individual floor and equipment drains located in the Reactor Building outside of the primary containment, and continues through gravity lines to the Reactor Building Floor Drain Sumps and Reactor Building Equipment Drain Tank. Duplex pumps at the 1-7 sump discharge the drainage through pressure piping to the attachment point on the discharge piping from the Drywell Floor and Equipment Drains system floor drain sump pumps. A single pump at the Reactor Building equipment drain tank discharges the drainage through pressure piping to the attachment point on the pump discharge piping from the Drywell Equipment Drain Tank. (These discharge pipes continue as part of the Drywell Floor and Equipment Drains system to the various Radwaste System collection tanks.) Included in this boundary are the gravity-fed floor drains and floor drain check valves relied on to prevent flooding of the Reactor Building areas by actuation of the Fire Protection System. Also included in this boundary is that portion of the system that is located in proximity to equipment performing a safety-related function. This includes the various valves, fittings, and other pressure retaining components relied upon to preserve the leakage boundary intended function of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scope of license renewal are equipment drain portions of the RFED that are encased in concrete, as leakage in this environment does not have the potential for spatial interaction, and equipment drains are not relied on to prevent flooding from Fire Protection System water. Not included in the RFED boundary are the following systems, which are separately evaluated as license renewal systems:
Radwaste System
Miscellaneous Floor and Equipment Drain Systems
Drywell Floor and Equipment Drains
Fire Protection System

Reason for Scope Determination

The Reactor Building Floor and Equipment Drains system does not meet 10 CFR 54.4(a)(1) because it is not a safety related system that is relied upon to remain functional during and following design basis events. It does meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48). The Reactor Building Floor and Equipment Drains system is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The RFED have the potential for spatial interaction with safety-related equipment within the Reactor Building. 10 CFR 54.4(a)(2)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). Portions of the RFED are relied upon to remove credible water flow due to actuation of the Fire Protection System in the Reactor Building. 10 CFR5 4.4(a)(3)

UFSAR References

9.3.3

License Renewal Boundary Drawings

LR-JC-147434 sheet 2
LR-JC-147434 sheet 3
LR-GE-148F437 sheet 2
LR-BR-2002 Sheet 2
LR-BR-2006 Sheet 1
LR-BR-M0012
LR-GE-148F262
LR-GE-148F444
LR-GE-148F711
LR-GE-197E871
LR-GE-237E487
LR-GE-237E756
LR-GE-885D781

Table 2.3.3.30 Reactor Building Floor and Equipment Drains
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (RBEDT pump)	Leakage Boundary
Tanks (RBEDT)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.30 Reactor Building Floor and Equipment Drains
-Summary of Aging Management Evaluation

2.3.3.31 Reactor Building Ventilation System

System Purpose

The Reactor Building Ventilation System (RBVS) is a continuously operating ventilation system with primary containment purge capability and an isolation mode. The system is designed to provide a controlled environment so that the maximum allowable ambient temperature for standard rated electrical equipment is not exceeded. It also regulates the static pressure within certain areas of the plant, so as to minimize the spread of airborne radioactive contamination from controlled to uncontrolled areas and provides for safe disposal of airborne contaminants. It accomplishes the above by maintaining a negative pressure within the Reactor Building with respect to outside atmosphere while ventilating the Reactor Building with fresh tempered air and by exhausting through the Ventilation Stack. The RBVS is also used during inerting and deinerting of primary containment and provides the flow paths for the Standby Gas Treatment System (SGTS) and the Containment Inerting System (CIS) for design basis events.

During normal operation, the RBVS is operating and the SGTS is in standby. During a Design Basis Accident the RBVS secondary containment isolation valves are closed, the RBVS fans stopped and the SGTS fans are automatically started and effluents are filtered prior to elevated release through the Ventilation Stack.

System Operation

The RBVS supply and exhaust is comprised of one air washer, three 50% capacity supply fans, a steam heating coil bank, supply & exhaust headers and ducts, secondary containment isolation valves, primary containment isolation valves, booster fans, Reactor Building normal and standby exhaust fans with separate duct exhausts to the Ventilation Stack and associated dampers, flexible connections and penetration piping. The trunnion room cooling consists of two recirculation fans with cooling coils and each of the four containment spray and core spray pump rooms consists of a recirculation fan with cooling coils.

The Reactor Building negative pressure monitoring instrumentation consists of local and control room indication of differential pressure between the Reactor Building and the outside atmosphere.

Air entering the system is cooled by an air washer or heated by steam coils prior to being drawn through the supply fans and discharged into two supply headers. Paired supply ducts distribute air throughout the buildings major elevations. The system also uses two isolation valves in series in each supply duct for secondary containment isolation. The operating exhaust fan draws building air into exhaust vents located throughout the building and discharge it through the Ventilation Stack. The normal ventilation exhaust ducts for the spent fuel, reactor cavity and dryer/separator pool area is arranged to take suction through multiple inlets around the periphery of the pools above the water line. Two isolation valves are installed in series in the main exhaust duct upstream of the exhaust fans air intake and downstream of any branch connections to the exhaust duct plenum. The operating exhaust fan pulls the discharge stream from this Reactor Building plenum through a fan inlet damper and discharge backdraft damper before discharge into the Ventilation Stack. The RBVS is also used during inerting to vent and during deinerting to purge and vent the primary containment when the reactor is shutdown for refueling or when primary containment access is required. During a

Design Basis Accident the operating RBVS supply and exhaust fans trip and lock out, and the isolation valves close on high drywell pressure or low-low reactor water level or high radiation levels in the Reactor Building. The SGTS starts automatically and draws from the RBVS exhaust ducts upstream of the isolation dampers. The RBVS is also used for post LOCA venting in conjunction with the SGTS and CIS.

The RBVS also includes the trunnion room recirculation fans which run during power operation and the containment spray, core spray and Control Rod Drive (CRD) pump room recirculation fans which operate with their corresponding pumps.

For more detailed information, see UFSAR Section 9.4.2.

<u>System Boundary</u>

The Reactor Building Ventilation System (RBVS) supply boundary begins at the inlet louver of the single intake and passes through an inlet damper, a wet cell air washer, a heating coil and into an intake plenum. The spray washers and the heating coils in the RBVS supply duct are supplied with water and steam from the Water Treatment & Distribution and Heating & Process Steam systems respectively. The spray nozzles, coils and connected piping are included and evaluated with their respective systems for license renewal. Three 50% supply fans in parallel draw air from the intake plenum and through air operated backdraft and balancing dampers before discharge into a common supply plenum feeding the Reactor Building supply air headers. The two supply headers feed the upper four elevations of the Reactor Building with parallel ducts to the five major elevations of the Reactor Building. As the supply ducts pass through the Reactor Building boundary they each contain a pair of Secondary Containment Isolation valves in series. Ductwork equipped with fire dampers then supplies the remaining elevations. A single duct also supplies the Drywell. The duct passes through the secondary containment isolation valves in series and drywell purge primary containment isolation valves in series and ends at the primary containment penetration. A pipe section of this supply downstream of the inboard drywell purge containment isolation valve, connects with the nitrogen supply of the CIS. Not included in the RBVS scoping boundary is the portion of this nitrogen supply piping upstream of the containment isolation valve leak test connection, which is evaluated as part of the CIS.

The RBVS exhaust duct boundary begins at the inlet registers at the major elevations and are joined by ducts from the piping penetrations from the drywell and torus. A single exhaust header that contains flow dampers and fire dampers connects through a locked open damper to the suction line of the parallel SGTS exhaust path before passing through the two secondary containment isolation valves in series and into a stack exhaust inlet plenum. The plenum connects to three exhaust ducts, each equipped with an exhaust fan, one for the Reactor Building, one for the Turbine Building and a standby, which discharge into the three exhaust ducts. All three of these separate fan exhaust ducts from the backdraft dampers are included in the RBVS scoping boundary which ends at the RBVS connection to the Ventilation Stack. Not included in the scoping boundary of the RBVS is the Turbine building exhaust fan, which is evaluated with the Turbine Building Ventilation System for license renewal scoping. The discharge duct of the standby exhaust fan connects with the discharge of the SGTS and the Radwaste Area Heating and Ventilation System prior to discharge to the Ventilation Stack. Not included in the scoping boundary of the RBVS are the discharge ducts from SGTS and Radwaste Area Heating and Ventilation System, which are evaluated with their respective systems for license renewal.

Additionally, the RBVS boundary also includes exhaust ducts connected with booster fans from the reactor water sample station of the Process Sampling System and the CRD rebuild room. Also included are the exhaust ducts from the Reactor Building Equipment Drain Tank of the Reactor Building Floor and Equipment Drains System and from the Post Accident Sampling System (PASS) room sample hoodof the Main Office Building.

Included in the RBVS boundary are the containment spray, core spray and CRD pump room recirculation fans and the trunnion room recirculation fans. The coils within the recirculation fans are supplied cooling water from the Reactor Building Closed Cooling Water (RBCCW) system. The cooling coils and connected RBCCW piping are included and evaluated with the RBCCW license renewal system.

Also contained within the RBVS is the Reactor Building negative pressure monitoring instrumentation.

Not included in the RBVS scoping boundary are the following systems, which are separately evaluated as license renewal systems:
Standby Gas Treatment System
Containment Inerting System
Radwaste Area Heating and Ventilation System
Containment Vacuum Breakers
Reactor Building Closed Cooling Water System

Not included in the scoping boundary of the RBVS are the drywell nitrogen relief vent valves and their associated piping up to the connections to the Reactor Building Ventilation System, which are evaluated with Containment Inerting System for license renewal scoping.

The Reactor Building Ventilation System supports the intended functions of primary and secondary containment boundary and control of combustible gas mixtures in the primary containment under accident conditions. The portion of the Reactor Building Ventilation System in scope for License Renewal includes the secondary containment isolation valves in series on the supply ducts from the Reactor Building wall to the valves and all duct and fittings between them. Also included are the primary containment purge and vent isolation valves and all pipe and fittings from the primary containment penetrations to the second outboard isolation valve and the RBVS torus ventilation exhaust line from the connection to the Containment Vacuum Breakers, including the torus ventilation exhaust valves. Additionally included are the exhaust ducts in the Reactor Building from the upper elevations to the in series secondary containment isolation valves, all ducts, dampers and fittings between them, a branch connection ending at the suction of the SGTS and the three stack exhaust system ducts from the fan exhaust backdraft dampers to the connections to the Ventilation Stack.

The exhaust ducts connected with booster fans from the reactor water sample station of the Process Sampling System and the CRD rebuild room along with the exhaust duct from the Reactor Building Equipment Drain Tank of the Reactor Building Floor and Equipment Drains System are not required to support intended functions. This portion of the Reactor Building Ventilation System exhaust is not included within the scope of license renewal.

Reason for Scope Determination

The Reactor Building Ventilation System meets 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The Reactor Building Ventilation System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Reactor Building Ventilation System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Equipment Qualification (10 CFR 50.49) and for Fire Protection (10 CFR 50.48). The Reactor Building Ventilation System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. (Drywell and Torus purge and vent valves provide primary containment isolation.) 10 CFR54.4(a)(1)
2. Provide secondary containment boundary. (Supply and exhaust ducts and isolation dampers minimize ground level release of airborne radioactive materials under accident conditions by limiting potential paths to the environment. Exhaust ducts direct airborne radioactive materials to SGTS before elevated release at the Ventilation Stack.) 10 CFR 54.4(a)(1)
3. Control combustible gas mixtures in the Primary Containment atmosphere. (The RBVS supports CIS for post accident combustible gas control of the containment atmosphere.) 10 CFR 54.4(a)(1)
4. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2) (The Reactor Building Ventilation System outdoor exhaust ducts connect to and support the Ventilation Stack boundary and are required to maintain their pressure boundary integrity to prevent the backflow of gas effluents and unmonitored releases to the environment.)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). (Fire dampers provide isolation to prevent spread of a fire, RBVS supports CIS with establishing the inert drywell environment in which a design basis fire cannot occur. The RBVS is not required to function during a fire or survive a fire.) - 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). The limit switches associated with the Primary Containment isolation valves are Environmentally Qualified - 10 CFR 54.4(a)(3)

UFSAR References

9.4.2
11.3.2.5

License Renewal Boundary Drawings

LR-BR-2011 sheet 2
LR-BR-2009 sheet 2

LR-GU-3E-243-21-1000

Table 2.3.3.31 Reactor Building Ventilation System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Closure bolting (Containment Isolation Components)	Mechanical Closure
Damper housing	Pressure Boundary
Door Seal	Pressure Boundary
Ductwork	Pressure Boundary
Piping and fittings	Pressure Boundary
Piping and fittings (Primary Containment Isolation Valves)	Pressure Boundary
Sensor Element (Temperature)	Pressure Boundary
Valve Body	Pressure Boundary
Valve Body (Primary Containment Isolation)	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.31 Reactor Building Ventilation System
-Summary of Aging Management Evaluation

2.3.3.32 Reactor Water Cleanup System

System Purpose

The Reactor Water Cleanup (RWCU) System is a filtration and demineralization system that maintains the purity of the water in the Reactor Coolant System. It can be operated during startup, shutdown, and refueling modes, as well as during power operation.

The purpose of the Reactor Water Cleanup System is to: reduce the deposition of water impurities on fuel surfaces, thus minimizing heat transfer surface fouling; reduce secondary sources of beta and gamma radiation by removing corrosion products, impurities and fission products from the reactor coolant; reduce the concentration of chloride ions to protect steel components from chloride stress corrosion; and maintain or lower water level in the reactor vessel during startup, shutdown and refueling operations, in order to accommodate reactor coolant swell during heatup and to accommodate water inputs from the Control Rod Drive System and the Head Cooling System.

Portions of the RWCU System are considered reactor coolant system pressure boundary. The RWCU System will automatically undergo partial or complete isolation depending upon the initiating event. Partial isolation removes the system from service without fully isolating it from the Reactor Coolant Pressure Boundary (closure of RWCU supply valve only). Partial isolation will occur for RWCU System/component protection in response to RWCU system anomalies (discussed further in System Operation section), or, for Standby Liquid Control (Liquid Poison) System flow. Full isolation of the RWCU System from the Reactor Coolant Pressure Boundary (closure of RWCU supply and return valves) occurs in response to low-low reactor water level or high drywell pressure RPS engineered safety feature system actuation parameters, or, indication of an RWCU High Energy Line Break (HELB).

System Operation

The RWCU System consists of a regenerative heat exchanger, a non regenerative heat exchanger, a pressure reducing station, cleanup filters and auxiliaries (e.g., precoat tank, precoat pump, filter aid pump, etc.), a cleanup demineralizer, cleanup pumps, a surge tank, a flow control station, a reactor drain station, isolation valves, and piping.

Reactor coolant flows under reactor pressure from the suction of Reactor Recirculation Pump B, through the RWCU supply isolation valves, is cooled in the regenerative and non regenerative heat exchangers (in series), is pressure reduced, filtered, demineralized, and pumped through a flow control valve and the regenerative heat exchanger, through the RWCU return isolation valves, to the discharge of Reactor Recirculation Pump B. When reactor pressure is insufficient to maintain the required suction pressure at the cleanup recirculation pump, an auxiliary cleanup pump is placed in operation. The RWCU System simultaneously takes suction from the Reactor Vessel bottom drain. Flow from this low point assists in preventing thermal stratification in the lower vessel head region and removes any impurities that may settle in the lower head region. The RWCU System can be used to remove excess water from the reactor in order to maintain reactor water level during startup, shutdown, and refueling evolutions. To lower reactor level, some of the cleanup system effluent flow is directed to the Condensate System or to the Radwaste System.

The RWCU System supply piping off of the Reactor Recirculation Pump B suction piping has an AC motor operated isolation valve inside the drywell and two parallel DC motor operated valves outside the drywell. The RWCU System return piping to the discharge of Reactor Recirculation Pump B has one AC motor operated valve outside the drywell and one check valve inside the drywell. The RWCU system supply isolation valves will close, and the cleanup pumps will stop automatically, under any of the following conditions: high drywell pressure, low-low reactor water level, high area temperature (RWCU HELB isolation signal), Standby Liquid Control System (Liquid Poison System) flow, or for RWCU System protection (e.g., low cleanup filter flow, high auxiliary pump cooling water outlet temperature, high non regenerative heat exchanger outlet temperature (reactor coolant), high pressure from the pressure reducing station). The RWCU System return isolation valve will close, and the cleanup pumps will stop automatically, under any of the following conditions: high drywell pressure, low-low reactor water level, high area temperature (RWCU HELB isolation signal).

The Noble Metals Monitoring System (NMMS) draws a small bypass flow of reactor coolant from around the RWCU Regenerative and Non-Regenerative Heat Exchangers. The NMMS is evaluated as its own License Renewal System.

For more detailed information, see UFSAR Section 5.4.

System Boundary

The RWCU System boundary starts at the attachment to the Reactor Recirculation Pump B suction piping and the attachment to the Reactor Vessel bottom drain. The boundary continues through the RWCU supply isolation valves, cleanup auxiliary pump, tube sides of the regenerative heat exchangers, tube sides of the non regenerative heat exchangers (the shell sides of the non regenerative heat exchangers are evaluated with the Reactor Building Closed Cooling Water System), pressure reducing station, cleanup filters (including filter auxiliaries), cleanup demineralizer, cleanup recirculation pumps, flow control station, shell sides of the regenerative heat exchangers, RWCU return isolation valves, and back to the attachment to the Reactor Recirculation Pump B discharge piping. Also included within the RWCU System boundary is the RWCU piping relief valve discharge line up to the suppression pool, the RWCU discharge (letdown) line to the Condensate System, the RWCU discharge (letdown) line to the Radwaste System, and the spent resin and waste filter sludge lines to the Radwaste System. All associated piping and components contained within the flowpaths described above are included in the RWCU boundary.

Included in the license renewal boundary of the RWCU System are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Reactor Building outboard of the Primary Containment isolation valves. Also included in the boundary are pressure retaining components located in the Reactor Building, Turbine Building, and Exhaust Tunnel relied upon to preserve the leakage boundary intended function of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the RWCU System scoping boundary are the following interface systems, which are separately evaluated as license renewal systems:
Reactor Recirculation System
Noble Metals Monitoring System
Condensate System

Radwaste System
Reactor Building Closed Cooling Water System

Reason for Scope Determination

The Reactor Water Cleanup (RWCU) System meets 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The RWCU System meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49). The RWCU system is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Introduce emergency negative reactivity to make the reactor subcritical. The RWCU System trips and partially isolates from the RCPB upon Standby Liquid Control (Liquid Poison) flow. - 10 CFR 54.4(a)(1)
2. Provide reactor coolant pressure boundary. The RWCU System trips and fully isolates from the RCPB upon indication of a RWCU HELB. - 10 CFR 54.4(a)(1)
3. Provide primary containment boundary. The RWCU System trips and fully isolates from the Primary Containment due to reactor low-low level or hi drywell pressure (RPS). - 10 CFR 54.4(a)(1)
4. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The RWCU System contains non-safety related water filled lines in the Reactor Building, Turbine Building, and Exhaust Tunnel which have spatial interactions (spray or leakage) with safety related SSCs. - 10 CFR 54.4(a)(2)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The RWCU isolation valves are credited as high/low pressure interfaces. - 10 CFR 54.4(a)(3)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). The Primary Containment isolation valves within the RWCU System are Environmentally Qualified. - 10 CFR 54.4(a)(3)

UFSAR References

5.4.3
5.4.8
6.2.4

License Renewal Boundary Drawings

LR-GE-148F444
LR-BR-2003
LR-GE-237E798
LR-GU-3E-243-21-1000
LR-BR-2013 sheet 6
LR-BR-2004 sheet 2

Table 2.3.3.32 Reactor Water Cleanup System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Coolers (Cleanup Pre-coat Pump)	Leakage Boundary
Coolers (Cleanup Recirc. Pumps Lube Oil)	Leakage Boundary
Demineralizer (Cleanup Demineralizer)	Leakage Boundary
Filter Housing (Cleanup Filter)	Leakage Boundary
Flow Element	Leakage Boundary
Gauge Snubber	Leakage Boundary
Heat Exchangers (Cleanup Non-Regenerative)	Leakage Boundary
Heat Exchangers (Cleanup Regenerative)	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (Cleanup Auxiliary Pump)	Leakage Boundary
Pump Casing (Cleanup Filter Aid Pumps)	Leakage Boundary
Pump Casing (Cleanup Filter Precoat Pump)	Leakage Boundary
Pump Casing (Cleanup Recirc Pumps)	Leakage Boundary
Pump Casing (Cleanup Sludge Pump)	Leakage Boundary
Restricting Orifice	Leakage Boundary
Sensor Element	Leakage Boundary
Sight Glasses	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks (Cleanup Backwash Tank)	Leakage Boundary
Tanks (Cleanup Filter Aid Mix Tank)	Leakage Boundary
Tanks (Cleanup Filter and Precoat Tank)	Leakage Boundary
Tanks (Cleanup Filter Sludge Receiver)	Leakage Boundary
Tanks (Cleanup Recirc. Pump Surge Tank)	Leakage Boundary
Tanks (Cleanup Recirc. Pumps Lube Oil)	Leakage Boundary
Thermowell	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.32 Reactor Water Cleanup System
-Summary of Aging Management Evaluation

2.3.3.33 Roof Drains and Overboard Discharge

System Purpose

The Roof Drains and Overboard Discharge System (RDODS) is a passive drainage system designed to collect and discharge effluents from the plant to the discharge canal. The purpose of the RDODS is to collect and discharge effluents from plant open cooling water systems, plant building drainage systems, and yard area storm drains. The RDODS accomplishes this through a 30" overboard discharge line that starts outside of the Reactor Building and runs to the discharge canal. It carries Service Water discharge from the Reactor Building Closed Cooling Water heat exchangers, Emergency Service Water from the Containment Spray System heat exchangers, Turbine Building sump 1-5 effluent, roof/floor/equipment drainage from various plant buildings, and yard area storm water.

System Operation

The RDODS is comprised of a 30" overboard discharge line that starts at the seal well (evaluated with Miscellaneous Yard Structures) outside of the Reactor Building. Service Water Discharged from the Reactor Building Closed Cooling Water heat exchangers enters the overboard discharge line through the seal well. Emergency Service Water from the Containment Spray System heat exchangers, Turbine Building sump 1-5 effluent, plant building roof/floor/equipment drainage, and plant yard area storm water drains enter the overboard discharge line at various locations along its length. The overboard discharge line runs below grade and terminates at the discharge canal.

The RDODS does not include process liquid monitoring. Process liquid monitoring is performed prior to the effluents entering the overboard discharge line. The Process Liquid Monitoring Subsystems (evaluated with Radiation Monitoring System) are comprised of the Reactor Building Closed Cooling Water Monitor, the Service Water Radiation Monitor and the Turbine Building sump 1-5 Radiation Monitor. These subsystems have been designed to continuously measure, indicate, and record the radioactivity concentration levels of major process system discharge streams. These monitors ensure that plant releases do not exceed the limits specified in 10CFR20 and 10CFR50 Appendix I.

For additional information, see UFSAR Section 9.3.3.2.9.

System Boundary

The overboard discharge portion of the RDODS boundary begins at the seal well outside of the Reactor Building and ends at the discharge canal. Also included in the RDODS boundary are the portions of the roof drain system relied upon to preserve the leakage boundary intended function of the roof drain piping and the portions of the Office Building roof drain system relied upon for drainage of Fire Protection System deluge spray from the New Cable Spreading Room floor drains.

Not included in the RDODS license renewal scoping boundary are the following systems, which are separately evaluated as license renewal system:
Miscellaneous Yard Structures (seal well, storm sewers and yard drainage)
Service Water System
Emergency Service Water System

Radiation Monitoring System
Discharge Structure and Canal
Miscellaneous Floor and Equipment Drain System

The RDODS supports the Emergency Service Water System by providing a flowpath for the Emergency Service Water System from the Containment Spray heat exchangers. The RDODS supports the Service Water System by providing a flowpath for the Service Water System from the Reactor Building Closed Cooling Water heat exchangers. The RDODS supports the Miscellaneous Floor and Equipment Drain System by providing a flowpath for Fire Protection System deluge spray from the New Cable Spreading Room floor drain system.

The non-safety related exposed roof drain piping located in the Reactor Building, Turbine Building, and Office Building is in scope for spatial interaction (leakage or spray). The portions of the roof drain system that are underground or embedded in concrete are not in scope since leakage in these environments does not have the potential for spatial interaction.

Reason for Scope Determination

The Roof Drains and Overboard Discharge System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The Roof Drains and Overboard Discharge System meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Roof Drains and Overboard Discharge System also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Roof Drains and Overboard Discharge System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62), Station Blackout (10 CFR 50.63), or Environmental Qualification (10 CFR 50.49).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The Roof Drains and Overboard Discharge System carries Emergency Service Water from the Containment Spray Heat Exchangers. The Roof Drains and Overboard Discharge System carries Service Water from the Reactor Building Closed Cooling Water Heat Exchangers which are used to cool the Spent Fuel Pool Cooling and Augmented Spent Fuel Pool Cooling Heat Exchangers. The Reactor Building, Turbine Building, and Office Building roof drain systems have potential spatial interaction (leakage/spray) with safety related equipment within these structures. - 10 CFR 54.4(a)(2)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). The Roof Drains and Overboard Discharge System carries Service Water from the Reactor Building Closed Cooling Water Heat Exchangers which are used to cool the Shutdown Cooling System. The Roof Drains and Overboard Discharge System carries Fire Protection System deluge spray from the Miscellaneous Floor and Equipment Drain System. - 10 CFR 54.4(a)(3)

UFSAR References

9.3.3.2.9

License Renewal Boundary Drawings

LR-BR-2005 sheet 2

Table 2.3.3.33 Roof Drains and Overboard Discharge
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Piping and fittings	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.33 Roof Drains and Overboard Discharge
-Summary of Aging Management Evaluation

2.3.3.34 Sanitary Waste System

System Purpose

The intended function of the Sanitary Waste System for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, Guidance on the Identification of Structures, Systems, and Components that meet 10 CFR 54.4(a)(2), dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The Sanitary Waste System consists of the Plumbing and Drainage System and the Sewage Lift Station System.

The Sanitary Waste System is designed for the collection of all plant sanitary waste drains and direct them to a controlled collection point. The purpose of the Sanitary Waste System is to provide the path for the sanitary waste and drains to the sewage collection tank.

System Operation

The Sanitary Waste System is comprised of sanitary waste piping and fixtures in the Office and TurbineBuildings, including floor drains in the Office Building. There are additional sanitary drains from the various plant buildings that join the main sanitary drain line. Domestic waste water from all plant locations enters a concrete equalizing tank. This tank discharges, through two self-priming diaphragm pumps (transfer pumps) to the Lacey Municipal Utilities Authority Sewer System and subsequently to the Ocean County Utilities Authority regional collection system via a gravity line.

A radiation monitoring system has been provided to continuously monitor radiation levels in the effluent of the transfer pumps. As a backup, manual samples may be taken from the sewage pit for laboratory analysis. The radiation monitor alarms below 50 percent of the 10 CFR 20, Appendix B, Table 1, Column 2, value for Co-60. Procedures require that the Control Room be immediately notified and that the alarm be investigated. If levels continue to rise, the sewage transfer pumps trip automatically below the 100 percent value of 10 CFR 20.

For more detailed information, see UFSAR Section 9.2.4.3 & 9.3.3.2.7.

System Boundary

The license renewal scoping boundary of the Sanitary Waste System encompasses the liquid filled portions of the system that are located in proximity to equipment performing a safety-related function. This is limited to the portions of the system located within the Turbine and Office Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. The sanitary vents are not included because they only contain sewer gas which does not impact safety-related components.

Not included in the scoping boundary of the Sanitary Waste System is the portion located in the areas beyond the Office and Turbine Buildings, as those portions of the system are not located within an area in proximity of components performing a safety-related function. Components that are not required to support the system leakage boundary intended function are not included in the scoping boundary of the Sanitary Waste System. Also not included are portions of the Sanitary Waste System that are encased in concrete, as leakage in this environment does not have the potential for spatial interaction.

Not included in the Sanitary Waste System scoping boundary is the following interfacing system, which is separately evaluated as a license renewal system:
Water Treatment & Distribution System

Reason for Scope Determination

The Sanitary Waste System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The Sanitary Waste System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Sanitary Waste System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The Sanitary Waste System has potential for spatial interaction with safety related equipment within the Turbine and Office Building. 10 CFR 54.4(a)(2)

UFSAR References

9.2.4.3
9.3.3.2.7

License Renewal Boundary Drawings

None

Table 2.3.3.34 Sanitary Waste System
Components Subject to Aging Management Review

Component Type	Intended Functions
Piping and fittings	Leakage Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.34 Sanitary Waste System
-Summary of Aging Management Evaluation

2.3.3.35 Service Water System

System Purpose

The Service Water System (SWS) is an open loop cooling system designed to provide seawater to various users during normal plant operation and shutdown. The purpose of the SWS is to provide seawater cooling to the tube side of the two Reactor Building Closed Cooling Water (RBCCW) heat exchangers. The SWS accomplishes this by supplying seawater from the plant intake structure to the RBCCW System heat exchangers and transferring the heat energy to the environment through the Roof Drains and Overboard Discharge System. The SWS provides alternate seawater cooling to the tube side of the two Turbine Building Closed Cooling Water (TBCCW) System heat exchangers normally serviced by the Circulating Water System. The SWS accomplishes this by supplying seawater from the plant intake structure to the TBCCW System heat exchangers and transferring the heat energy to the environment through the plant Discharge Structure and Canal.

The SWS also is used to maintain the Emergency Service Water (ESW) side of the Containment Spray heat exchangers full. The SWS accomplishes this through a crosstie between the normally operating SWS and the standby ESW System.

System Operation

The SWS is comprised of pumps, heat exchangers, piping, valves, controls and instrumentation. Two half capacity SWS pumps discharge to a common header which branches to either the two half capacity RBCCW System heat exchangers or the two half capacity TBCCW System heat exchangers. From the RBCCW System heat exchangers, SWS flows into a common header, through a Seal Well, and terminates at the Roof Drains and Overboard Discharge System. From the TBCCW System heat exchangers, SWS flows into a common header, through the plant discharge tunnel, and terminates at the Discharge Structure and Canal. Water flow and temperature are controlled manually through manipulation of SWS valves.

For maintaining the ESW System side of the Containment Spray heat exchangers full, a line branches off of the SWS discharge header, splits, and connects to the discharge header of each ESW loop. Check valves (evaluated with the ESW System) are provided to prevent the loss of ESW System flow through the SWS.

The SWS has several interfaces with the Chlorination System. The Chlorination System injection system delivers sodium hypochlorite to the SWS headers for the control of biofouling. Additionally, the SWS provides the operating pressure for the Circulating Water and Service Water eductors (evaluated with the Chlorination System).

Process liquid monitoring (evaluated with the Radiation Monitoring System) is provided to monitor the gross radioactivity of the service water effluent from the RBCCW heat exchangers. Service Water radiation levels are recorded and alarmed in the Main Control Room.

During outages when performing maintenance on the SWS, the ESW System can be aligned to support the SWS loads through a cross-connect line between the ESW and SWS. The ESW connection is located upstream of the Containment Spray heat exchangers and the SWS connection is located upstream of the RBCCW heat exchangers. A normally closed manual valve (evaluated with the ESW System) provides isolation between the ESW and SWS headers during normal plant operation.

For additional information, see UFSAR Section 9.2.1.

System Boundary

The SWS boundary begins at the SWS pumps and continues through the tube side of the RBCCW System heat exchangers and the tube side of the TBCCW System heat exchangers. The boundary continues from the RBCCW and TBCCW System heat exchangers to the Roof Drains and Overboard Discharge System and the Discharge Structure and Canal. Included in the boundary are the branch connections to the ESW System up to the ESW System stayfull line check valves and up to the ESW/SWS cross-connect line manual isolation valve. Also included in the boundary are the branch connections to the Chlorination System up to the circulating water and service water eductors and from the service water eductor back to the SWS discharge header. All associated piping, components, and instrumentation contained within the flowpath described above are also included in the SWS boundary.

Included in the license renewal boundary of the SWS are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Intake Structure and Reactor Building. Also included in the boundary are pressure retaining components located in the Turbine Building relied upon to preserve the leakage boundary intended function of this portion of the system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the SWS license renewal scoping boundary are the following systems, which are separately evaluated as license renewal system:
Reactor Building Closed Cooling Water System
Turbine Building Closed Cooling Water System
Emergency Service Water System
Circulating Water System
Radiation Monitoring System
Roof Drains and Overboard Discharge System
Discharge Structure and Canal
Chlorination System

Not included in the scoping boundary of the SWS are the SW to ESW stayfull line check valves and the ESW/SW cross-connect line manual isolation valve which are evaluated with the ESW System. Not included in the scoping boundary of the SWS are the circulating water and service water eductors which are evaluated with the Chlorination System. Not included in the scoping boundary of the SWS is the in-line SW discharge radiation sampler chamber and detector which are evaluated with the Radiation Monitoring System.

The SWS supports the Spent Fuel Pool Cooling System in ensuring adequate cooling in the spent fuel pool to maintain stored fuel within acceptable temperature limits. This portion of the system includes that which must remain operational and pressurized to provide cooling water to the RBCCW System heat exchangers (RBCCW is the heat sink for the Spent Fuel Pool

Cooling heat exchangers). It includes the SWS pumps, the RBCCW System heat exchangers, and all piping and valves associated with establishing this flowpath.

The SWS supports the Fire Protection intended function. This portion of the system includes that which must remain operational and pressurized to provide cooling water to theRBCCW System heat exchangers (RBCCW provides cooling for the Shutdown Cooling System heat exchanger and pumps). It includes the SWS pumps, the RBCCW System heat exchangers, and all piping and valves associated with establishing this flowpath.

All other non-safety related SWS piping and components are in scope for spatial interaction (leakage or spray). This includes the portions of the SWS located in the Turbine Building associated with the TBCCW System heat exchangers.

Reason for Scope Determination

The Service Water System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The Service Water System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Service Water System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48). The Service Water System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The SWS ensures that the Spent Fuel Pool Cooling and Augmented Spent Fuel Pool Cooling heat exchangers maintain stored fuel within acceptable limits by providing cooling water to the RBCCW System heat exchangers. The SWS contains non-safety related water filled lines throughout the Turbine Building which have spatial interactions (spray or leakage) with safety related SSCs. - 10 CFR 54.4(a)(2)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The SWS is credited for supporting the Reactor Building Closed Cooling Water (RBCCW) System. - 10 CFR 54.4(a)(3)

UFSAR References

9.2.1.1

License Renewal Boundary Drawings

LR-BR-2005 Sheet 2
LR-BR-2005 Sheet 4
LR-BR-2005 Sheet 6
LR-FP-SE-5419

Table 2.3.3.35 <u>Service Water System</u>
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Eductor	Leakage Boundary
Expansion Joint	Pressure Boundary
Flow Element	Pressure Boundary
Gauge Snubber	Pressure Boundary
Heat Exchangers (RBCCW)	Heat Transfer
	Pressure Boundary
Heat Exchangers (TBCCW)	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (Rad Monitor Sample Pump)	Pressure Boundary
Pump Casing (Service Water Pumps)	Pressure Boundary
Restricting Orifice	Pressure Boundary
	Throttle
Rotameter	Pressure Boundary
Sample Chamber	Pressure Boundary
Sight Glasses	Leakage Boundary
Strainer	Filter (Rad Monitor Duplex Strainer)
Strainer Body	Leakage Boundary
	Pressure Boundary (Rad Monitor Duplex Strainer)
Tanks (Service Water Pump Oil Reservoir)	Pressure Boundary
Thermowell	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.35 Service Water System
-Summary of Aging Management Evaluation

2.3.3.36 Shutdown Cooling System

System Purpose

The Shutdown Cooling System (SCS) is a high pressure system designed to remove fission product decay heat during shutdown. The system is normally isolated and not in-service during plant power operation. Immediately following shutdown of the reactor, the initial cooling and removal of decay heat is accomplished by means of the Turbine Bypass System, which directs steam to the Main Condenser. When coolant temperature has been reduced to the point where the Main Condenser can no longer be used as a heat sink, the SCS is placed in operation to reduce reactor coolant temperature and complete the cooling.

The purpose of the SCS is to remove decay heat during shutdown, providing a means of completing the cooldown of the reactor pressure vessel, and to maintain a reasonably low reactor coolant temperature throughout a refueling or maintenance period. The SCS accomplishes this purpose by circulating reactor coolant from the Reactor Recirculation system through the shutdown cooling heat exchangers. The heat is transferred in the heat exchangers to the Reactor Building Closed Cooling Water System (RBCCW).

The SCS is not an Emergency Core Cooling Syste (ECCS), however the SCS may be placed in service if available during emergencies, following initial reactor cooldown and depressurization, to assist the ECCS in removing decay heat.

System Operation

The SCS is comprised of three pumps, three heat exchangers, and associated controls, instrumentation, motors and valves. The portion of the system from the Reactor Recirculation System up to the inboard primary containment isolation valves is stainless steel, designed to the same temperature and pressure specifications as the reactor vessel. The rest of the system is carbon steel. The SCS inlet line is attached to the suction line of recirculation pump E upstream of its suction isolation valve, taking reactor water to the motor operated isolation valve inside containment. This line exits containment, branching into three trains, with each line directing flow to a SCS pump suction. The discharge of each pump continues through the tube side of a SCS heat exchanger. Downstream of the heat exchangers, the three lines combine into a single discharge header which re-enters the containment. A motor operated isolation valve is provided inside the drywell. This header attaches to the discharge pipe of recirculation loop E, downstream of its discharge isolation valve. Each of the three SCS pump and heat exchanger trains has a pump suction isolation valve, a motor operated throttling isolation valve downstream of the heat exchanger outlet, and a manually operated isolation valve downstream of the throttling isolation valve.

The two motor operated isolation valves inside containment are interlocked to prevent opening if the reactor water temperature at the suction of any recirculation pump exceeds the SCS maximum allowable inlet temperature. Interlocks also prevent opening, and automatically close these valves on either low-low reactor water level, or high drywell pressure.

Flow elements are installed downstream of the heat exchangers to provide local indication for each SCS loop. The pumps are provided with interlocks that prevent operation unless the minimum NPSH is available, and also to protect the system against inadvertent operation at excessive temperature. A minimum flow recirculation line connected from the outlet of the heat exchanger to the pump suction protects each pump. The shell side of the SCS heat exchangers is cooled by RBCCW, which also supplies cooling water to the pump bearings and seals.

The heat exchangers are of the horizontal U-tube type. Relief valves are provided on the shell and tube sides of the heat exchangers, discharging to the reactor building equipment drain tank (evaluated with the Reactor Building Floor and Equipment Drain System). SCS temperatures at inlet and outlet locations are indicated and a high temperature condition is alarmed.

For more detailed information, see UFSAR Section 5.4.7.

System Boundary

The SCS system boundary begins with the reactor coolant supply piping attachment on the suction line of recirculation pump E, upstream of the suction isolation valve. It exits the drywell into the reactor building and separates into three pump and heat exchanger trains. Each pump and heat exchanger train has a minimum flow line routed from the exit of the heat exchanger back to the inlet side of the pump, with an air-operated valve and flow-restricting orifice. Downstream of each heat exchanger is a flow-measuring element. The three trains combine into a single header, enter the drywell, and return to the reactor through the piping attachment on the discharge pipe of recirculation loop E, downstream of the discharge isolation valve. Included in this boundary are the SCS isolation valves, heat exchanger relief valve piping up to and including the relief valves, local drain and vent piping up to the normally closed valve(s), and the temperature sensing devices (switches and measuring elements), all of which are located in thermowells.

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

Not included in the SCS scoping boundary is the cooling water supply to and return from the shell side of each heat exchanger (scoped with the RBCCW system), or the discharge piping from the heat exchanger relief valves to the reactor building equipment drain tank. Not included in the SCS scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Reactor Recirculation System
Reactor Building Closed Cooling Water System
Reactor Building Floor and Equipment Drain System

Reason for Scope Determination

The Shutdown Cooling System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10

CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), and environmental qualification (10 CFR 50.49). The Shutdown Cooling System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
2. Provides primary containment boundary isolation valves close on low-low reactor water level or high drywell pressure, however system is considered an extension of the primary containment boundary. 10 CFR 54.4(a)(1)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)
5. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. 10 CFR 54.4(a)(2)

UFSAR References

5.4.7

License Renewal Boundary Drawings

LR-GE-148F711
LR-BR-2006 Sheet 2
LR-BR-2015 Sheet 2
LR-BR-M0012
LR-GE-237E798

Table 2.3.3.36 Shutdown Cooling System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Coolers (Shutdown Cooling Pumps)	
Flow Element	Pressure Boundary
Heat Exchangers (Shutdown Cooling)	
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing	Pressure Boundary
Restricting Orifice	Pressure Boundary Throttle
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.36 Shutdown Cooling System
-Summary of Aging Management Evaluation

2.3.3.37 Spent Fuel Pool Cooling System

System Purpose

The Spent Fuel Pool Cooling System (SFPCS) consists of two systems located in the reactor building that operate independently from each other except for a common suction flowpath and a common discharge flowpath. The first system is the SFPCS designed to remove heat from the spent fuel pool and maintain fuel storage pool water clarity. The other system is the Augmented SFPCS that was added after plant construction due to higher than anticipated spent fuel storage requirements. This system is operated during refueling operations due to the higher heat loads. This scoping evaluation does not include structures such as the spent fuel pool, reactor cavity, skimmer surge tanks and equipment storage cavity (evaluated with the Reactor Building Structure).

The purpose of the SFPCS is to remove decay heat from spent fuel assemblies that are stored within the Spent Fuel Storage Pool during all modes of operation, to remove decay heat from the water inventory contained within the reactor cavity and equipment storage cavity during refuel outages, to minimize thermal stresses within the floor and walls of the Spent Fuel Storage Pool and maintain the chemistry of the Spent Fuel Storage Pool water inventory within acceptable EPRI guidelines. It accomplishes this by delivering recirculated water from the fuel pool during normal operation as well as from the reactor cavity and equipment storage cavity during refueling outage, which is pumped through the SFPCS heat exchangers. The SFPCS heat exchangers then remove the heat from the pool and cavities and transfer it to a closed cooling water system.

System Operation

The SFPCS is comprised of two pumps, two heat exchangers, a filter, a demineralizer, associated piping and valves, and interconnections to Condensate Transfer System, Radwaste and the Condensate/Feedwater System. The Augmented SFPCS consists of two augmented pumps and one augmented heat exchanger. These components tie-in downstream of the skimmer surge tanks (common suction flowpath) and continue through the fuel pool filter and demineralizer or directly to the Spent Fuel Pool (common discharge flowpath).

For the SFPCS main flow path, water from the fuel storage pool overflows via scuppers and an adjustable weir into two cross-tied skimmer surge tanks (evaluated with the Reactor Building Structure). The skimmer surge tanks drain into a common suction header for the fuel pool cooling pumps. Two parallel flow paths exist from the header, each with a fuel pool cooling pump taking suction from the header and discharging through tube side of the fuel pool cooling heat exchanger. Cooling water to the shell side of the heat exchangers is supplied from the Reactor Building Closed Cooling Water System that in turn is cooled by the Service Water System. A crosstie line exists on the pump discharge piping in order to operate either pump with either heat exchanger. The heat exchangers discharge into a common header, that first flows through the fuel pool filter, and then through the fuel pool demineralizer. The fuel pool demineralizer discharges back into the fuel storage pool through two lines and diffusers at the bottom of the fuel pool. The demineralizer/filter can be bypassed when there is not an issue with water clarity. The return lines to the fuel storage pool enter near the top have check valves and openings in the piping below the pool surface to act as anti-siphon devices, to preclude uncontrolled draining of the pool during a pipe break.

The following components operate only during outage periods; the piping and components downstream of the reactor cavity recirc valve because they are normally isolated from the SFPCS by a normally closed reactor cavity recirc valve, the piping and components associated with the ractor cavity drains and equipment storage cavity liner drains. The Spent Fuel Pool liner drains are connected to the area under the fuel pool liner for leak detection.

During refueling operations, the Augmented SFPCS may be aligned by manual valves to discharge into the reactor cavity and equipment storage cavity. The reactor cavity and equipment storage cavity are filled, and the gates are removed between the Spent Fuel Pool and the reactor cavity. This allows the flow to continue to the reactor cavity via two diffusers and to the fuel pool through anti siphon check valves and diffusers within the fuel pool as previously mentioned above. The Augmented SFPCS removes decay heat from the spent fuel assemblies that are stored within the Spent Fuel Storage Pool, as well as, decay heat from the water inventory contained within the reactor cavity and equipment storage cavity. The system circulates the Spent Fuel Storage Pool water inventory and maintains the Spent Fuel Storage Pool water inventory at a predetermined temperature. Water flows from the Spent Fuel Storage Pool, over two adjustable skimmer weirs located in the Spent Fuel Storage Pool, four skimmer weirs located in the reactor cavity and skimmer weirs located in the equipment storage cavity and into the skimmer surge tanks. The water is pumped through the augmented heat exchanger. Cooling water to the shell side of the heat exchangers is supplied from the Reactor Building Closed Cooling Water (RBCCW) System with backup from the Turbine Building Closed Cooling Water System, when the RBCCW System is out of service for maintenance.

The SFPCS is designed for both normal and accident conditions. The accident considered is the loss of offsite power coincident with a single active component failure. The Augmented SFPCS is designed to provide a seismically qualified cooling loop, capable of providing cooling during a Loss of Offsite Power (LOOP) with a single active component failure. The system is designed to prevent reduction in fuel storage coolant inventory during accident conditions. In addition, the system is designed with sufficient monitoring systems to detect conditions that could result in the loss of decay heat removal, and to initiate appropriate safety actions. Telltale drains with annunciated flow indicating switches detect leakage through the bellows seal at the reactor vessel to drywell joint and detect leakage into the space between the refueling gates. There is a curb (evaluated with Reactor Building Structure) around the cavities to direct any overflow to drains.

Normal demineralized water makeup to the pool is provided from the Condensate Storage Tank by the Condensate Transfer System. Additional makeup can be provided from the Demineralized Water Storage tank by the demineralized water transfer pumps through the use of hoses. Other sources of water are also available through the use of fire pumps or portable pumps. The diesel driven fire pumps for the Fire Protection System can be used to provide makeup water from the Fire Pond to the Condensate Storage Tank through a permanent connection.

For more detailed information, See UFSAR Section 9.1.3.

System Boundary

The boundary of the SFPCS begins at the suction piping to the skimmer surge tanks. It continues through the SFPCS pumps, heat exchangers, a filter, a demineralizer and associated piping and valves, through anti-siphon check valves and to the bottom of the fuel pool via diffusers. The water spills over the Spent Fuel Pool weirs into the skimmer surge tanks.

In addition during refuel operations, there is a parallel Augmented SFPCS which begins at the common suction header from the skimmer surge tank through the augmented fuel pool cooling pumps and augmented fuel pool cooling heat exchanger and returns to the common discharge flow path downstream of the demineralizers. Included in the boundary is the piping that discharges into the reactor cavity, equipment storage cavity and spent fuel pool. Water returns to the skimmer surge tanks over the weirs in the spent fuel pool and through skimmer drain headers located in the reactor and equipment storage cavities during refuel operations.

The following items are not required for the cooling flow path for the SFPCS but are included in the SFPCS scoping boundary: skimmer drain header, equipment storage drains and spent fuel pool liner drains.

All associated piping, components and instrumentation contained within the flow path described above are included in the system evaluation boundary.

Not included in the scoping boundary of the SFPCS license renewal scoping boundary are items such as refueling bellows, fuel pool gates, reactor cavity, skimmer surge tank, equipment storage cavity, spent fuel pool and it's supporting structure, which are separately evaluated in the Reactor Building Structure.

Not included in the scoping boundary are the piping and components associated with the SFPCS filter and demineralizer that can be bypassed and are not required for the cooling flow path for the SFPCS intended function.

Not included in the SFPCS license renewal scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Reactor Building Closed Cooling Water System
Turbine Building Closed Cooling Water System
Condensate Transfer System

Reason for Scope Determination

The Spent Fuel Pool Cooling System (SFPCS) is in scope under 10 CFR 54.4(a)(1) because it is relied on to remain functional during and following design basis events. The SFPCS is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The SPFC is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Ensure adequate cooling in the spent fuel pool to maintain stored fuel within acceptable temperature limits. The SFPCS operates continuously to circulate and cool the Spent Fuel Storage Pool water inventory and maintain the Spent Fuel Storage Pool water inventory at a predetermined temperature. 10 CFR 54.4 (a)(1)
2. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a

safety related function. 10 CFR 54.4(a)(2)

UFSAR References

1.2
3.1
3.2
7.5
9.1
11.1

License Renewal Boundary Drawings

LR-GE-237E756

Table 2.3.3.37 Spent Fuel Pool Cooling System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Diffuser	Direct Flow
Flow Element	Leakage Boundary
	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing (Fuel Pool Cooling Pumps & Augmented Fuel Pool Cooling Pumps)	Pressure Boundary
Thermowells	Pressure Boundary
Valve Body	Leakage Boundary Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.37 Spent Fuel Pool Cooling System
-Summary of Aging Management Evaluation

2.3.3.38 Standby Liquid Control System (Liquid Poison System)

System Purpose

The Standby Liquid Control System (SLCS), or Liquid Poison System, is a standby and redundant sodium pentaborate injection system. The system is designed to bring the reactor to a shutdown condition at any time in core life independent of control rod capabilities. The SLCS operates independently from the Control Rod Drive System. The most severe requirement for which the system is designed is shutdown from a full power operating condition assuming complete failure of the Control Rod Drive System to respond to a scram signal.

The purpose of the SLCS is to provide sufficient capacity for controlling the reactivity difference between the steady state rated operating condition of the reactor and the cold shutdown condition, including shutdown margin, thereby ensuring complete shutdown capability from the most reactive condition, at any time in core life. The SLCS accomplishes this purpose by injecting sodium pentaborate solution into the reactor vessel to absorb thermal neutrons. The SLCS is not provided as a backup for reactor trip functions, since most transient conditions that require reactor trip occur too rapidly to be controlled by the SLCS.

The SLCS is capable of satisfying the requirements of the SLCS generic design basis as well as the requirement for the reduction of risks from an anticipated transient without scram (ATWS) as specified in 10CFR50.62(c)(4) (ATWS Rule).

System Operation

The SLCS is comprised of an atmospheric pressure tank for sodium pentaborate solution storage (Liquid Poison Tank), a common pump suction header feeding two parallel full capacity high pressure positive displacement pumps, two accumulators, two explosive actuated shear plug valves, a common discharge header and poison sparger ring, a test tank, and associated piping and valves. The SLCS is manually initiated from the main control room through the use of a keylock switch which starts the selected pump and actuates its explosive actuated valve. This ensures that switching on the system is a deliberate act.

Suction to the SLCS pumps is from the Liquid Poison Tank through a common suction header. Flow is provided by one of two full capacity positive displacement pumps. Accumulators are installed in each pump discharge line to absorb pressure pulsations from the positive displacement pumps. The pumps and piping are protected by overpressure by relief valves which discharge back to the Liquid Poison Tank. Following system initiation, the explosive valve associated with the selected pump is actuated to provide a flowpath to the Reactor Vessel. The sodium pentaborate solution is pumped to the vessel through a common discharge header, through two (2) check valves, and delivered to the vessel through a sparger ring (evaluated with Reactor Internals System) near the bottom of the core shroud so that it mixes with cooling water rising through the core.

An electric heater is installed in the Liquid Poison Tank and the pump suction lines are provided with electrical heat tracing and thermal insulation to prevent crystallization of the sodium pentaborate solution. Provisions for recirculating the sodium pentaborate solution are included to assure the readiness of the Liquid Poison Tank and the pump suction. A test tank (with demineralized water) is provided for functional testing of the standby liquid control pumps, injection valves, and sparger without injecting boron solution.

A flow switch in the injection line will provide a signal to trip the Reactor Water Cleanup System to prevent loss or dilution of the boron in the vessel through the Reactor Water Cleanup System demineralizers or through Reactor Water Cleanup System letdown.

The SLCS injection piping containment penetration is provided with two (2) normally closed check valves in series which are included in the license renewal boundary for SLCS.

The SLCS injection piping can be used by the Post Accident Sampling System (PASS) to provide a backup reactor water sample when SLCS is not in service. The PASS piping up to the SLCS injection piping is evaluated with the Post Accident Sampling System.

For more detailed information, see UFSAR Section 9.3.5.

System Boundary

The boundary of the SLCS begins with the Liquid Poison Tank and includes the SLCS positive displacement pumps, relief valves, accumulators, pump discharge check valves, explosive actuated valves, injection piping check valves, and the piping to the reactor vessel. The boundary includes the Liquid Poison Tank heaters, heat trace, the SLCS test tank and demineralized water lines, system drain lines, drain tank and drain manifold.

The SLCS boundary also includes the demineralized water supply line and control air supply line attached to the Liquid Poison Tank used for the filling and mixing of the boron solution through the Liquid Poison Tank air sparger. This portion of the boundary extends from the Liquid Poison Tank out to the SLCS check valves located on the demineralized water and control air supply lines (evaluated with the Water Treatment & Distribution System and Instrument (Control) Air System).

All associated piping, components, and instrumentation contained within the flowpath described above are included in the SLCS boundary.

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

Not included in the SLCS license renewal scoping boundary are the following systems, which are separately evaluated as license renewal systems:
Water Treatment & Distribution System
Instrument (Control) Air System

Not included in the scoping boundary of the SLCS is the poison sparger ring which is evaluated with the Reactor Internals System for license renewal scoping. Not included in the scoping boundary of the SLCS is the Post Accident Sampling System piping up to the SLCS injection piping which is evaluated with the Post Accident Sampling System for license renewal scoping.

Reason for Scope Determination

The Standby Liquid Control (Liquid Poison) System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The Standby Liquid Control System meets 10 CFR 54.4(a)(2) because failure of the non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62). The Standby Liquid Control System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), or SBO (10 CFR 50.63).

System Intended Functions

1. Provide reactor coolant pressure boundary. - 10 CFR 54.4(a)(1)
2. Provide primary containment boundary. The SLCS injection piping contains valves which are considered containment isolation devices. - 10 CFR 54.4(a)(1)
3. Introduce emergency negative reactivity to make the reactor subcritical. Brings the reactor to a shutdown condition at any time in core life, independent of control rod capabilities. Provides flow signal to RWCU isolation circuitry. - 10C FR 54.4(a)(1)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Anticipated Transients without Scram (10 CFR 50.62). - 10 CFR 54.4(a)(3)
5. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The SLCS is located within the Reactor Building and contains non-safety related water filled lines which have potential spatial interaction (spray or leakage) with safety related SSC's, and, it contains non-safety related piping that provides structural support for safety related piping. - 10 CFR 54.4(a)(2)

UFSAR References

3.1
4.6.4.1
7.4.1
9.3.5
15.8

License Renewal Boundary Drawings

LR-GE-148F723
LR-GE-148F712

Table 2.3.3.38 Standby Liquid Control System (Liquid Poison System) Components Subject to Aging Management Review

Component Type	Intended Functions
Accumulator	Pressure Boundary
Closure bolting	Mechanical Closure
Flow Element	Leakage Boundary
	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
	Structural Support
Pump Casing	Pressure Boundary
Tanks (Liquid Poison Tank)	Pressure Boundary
Tanks (Liquid Poison Test Tank)	Leakage Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) -Summary of Aging Management Evaluation

2.3.3.39 Traveling In-Core Probe System

System Purpose

The Traveling In-Core Probe (TIP) System is an electrical instrumentation system designed to provide neutron flux data to be used for calibration of the LPRM (Local Power Range Monitor) detectors and to determine axial neutron flux levels for core power distribution measurements.

The purpose of the TIP system is to measure core neutron flux at various positions throughout the core. The TIP system accomplishes its purpose by utilizing a set of fission chamber detector instruments identical to those used by the LPRM system, and a positioning system capable of moving the fission chamber detectors to various locations in the core corresponding to the locations of the LPRM detectors. The moveable TIP detectors, as with the fixed LPRM detectors, generate signals that are processed to indicate neutron flux levels in the vicinity of each detector.

Since the TIP detectors are capable of being fully withdrawn from the core and outside of primary containment, the TIP system contains mechanical components designed to assure primary containment integrity. The TIP system does not generate any rod block or scram signals for protection of the reactor, however the portion responsible for providing primary containment integrity is in scope for license renewal. The TIP system is not credited with a reactor coolant pressure boundary (RCPB) integrity function since the in-vessel located dry tubes that provide the RCPB boundary are evaluated with the Reactor Internals system. The majority of the TIP system is not in scope for license renewal.

System Operation

The TIP system is comprised of four trains, each consisting of a fission chamber detector identical to the LPRM fission chamber detectors, attached to a triaxial drive and signal cable which is helically wrapped in carbon steel.

Each detector is driven by a drive mechanism consisting of a drive reel assembly capable of inserting and withdrawing the detector at either a low or high drive speed. A digital position indicator provides core top and bottom indication, and continuous digital indication of detector position.

A storage pig consisting of a cylindrical cask filled with lead shot is associated with each detector and drive mechanism. It houses and shields the detector when fully withdrawn from the drywell.

TIP guide tubing provides a guide for the TIP detector throughout its travel from the storage pig to the core top position inside the reactor vessel. The dry tubes inside the reactor vessel are evaluated with the Reactor Internals system.

An indexing mechanism associated with each detector allows the selection of any of 10 locations for each detector, including a core location common to all four detectors for purposes of calibration.

The TIP flux probe monitor consists of a dual channel amplifier and a power supply. The amplifier conditions the detector signal to provide an input to the plant computer for determining flux level. The power supply provides operating power to the flux amplifier and to the detector for biasing.

The drive control unit provides control of detector insertion and retraction. It determines and displays detector position in the core, monitoring the TIP detector throughout its operation with status lights.

The isolation valve system consists of a ball valve and explosive-actuated shear (squib) valve located outside the drywell for each of the four TIP drive systems. The ball valve is normally closed except when the detector is inserted. The ball valve can be manually controlled, but is normally opened and closed automatically, with interlocks to open the valve when the detector leaves the shield, and to deenergize the drive mechanism should the ball valve not open after the insert operation is selected for the TIP detector. Upon receipt of a containment isolation signal, an inserted TIP detector is fully retracted at the high travel speed and the ball valve automatically closes when the detector reaches the storage pig. The shear valve is used only to isolate a leak while a detector is inserted and power is lost to the drive mechanism, or some other fault has occurred which prevents retraction of the TIP. A keylock switch manually activates the shear valve. When actuated, a guillotine will cut the TIP guide tube and detector cable inside it and will seal the guide tube. The valve control monitor controls the valve interlocks and indicates position of the ball and shear valves. The keylock operator for the explosive actuated shear valve is located and powered from the valve control monitor.

The TIP purge system provides a dry environment for the TIP detectors and cables. The Nitrogen Supply System provides nitrogen to the TIP indexers and guide tubing when the containment is inerted, and instrument air when not inerted. The containment isolation function of the TIP purge system is evaluated with the Nitrogen Supply System.

For more detailed information, see UFSAR section 7.5.1.8.8.

<u>System Boundary</u>

The TIP system boundary for each of the four TIP trains begins with the storage pig outside the primary containment where the detector is stored when fully retracted, and continues through the TIP guide tubing to the isolation valve system and to the containment penetration. Inside the primary containment, the TIP guide tubing continues to the indexer, from which multiple TIP guide tubes proceed to the reactor vessel, ending at the core top position inside the vessel. Included in the TIP system boundary are the drive mechanisms, TIP guide tubes, storage pigs, isolation valve systems, indexers, four-way connector (which provides a pathway for each indexer to send a detector to the same location for calibration), triaxial drive and signal cables, detectors, and electronic equipment necessary to obtain and process the TIP signals.

Not included in the scoping boundary of the TIP System are the dry tubes inside the reactor vessel, which are included in the Reactor Internals scoping boundary, and the TIP guide tube containment penetrations, which are included with the Primary Containment. Also not included is the containment isolation function of the TIP purge system, which is evaluated with the Nitrogen Supply System. Not included in the TIP System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Reactor Internals
Primary Containment
Nitrogen Supply System

Instrument (Control) Air System

The portion of the TIP system boundary that is in scope for license renewal provides the primary containment boundary. It is comprised of the TIP guide tubing from the interface with the primary containment penetration to and including the shear valve on each of the four TIP system trains. This boundary includes the ball valve associated with each train, which is located between the shear valve and the primary containment penetration. All other portions of the TIP system are not in scope for license renewal as they are not required to support the intended function of providing primary containment boundary.

Reason for Scope Determination

The Traveling In-Core Probe System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied upon to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It does not meet the requirements of 10 CFR 54.4(a)(3) since it is not required to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. Shear valves, ball valves, and interconnecting tubing to the containment penetration provide primary containment isolation. 10 CFR 54.4(a)(1)

UFSAR References

7.5.1.8

License Renewal Boundary Drawings

LR-SN-13432.19-1

Table 2.3.3.39 Traveling In-Core Probe System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Piping and fittings	Pressure Boundary
Valve Body	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.39 Traveling In-Core Probe System
-Summary of Aging Management Evaluation

2.3.3.40 Turbine Building Closed Cooling Water System

System Purpose

The intended function of the Turbine Building Closed Cooling Water (TBCCW) System for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, "Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2)", dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The TBCCW System is a closed-loop system designed to provide inhibited demineralized cooling water to the reactor recirculation pump MG sets and Turbine Building equipment that is not subject to radioactive contamination. Included in the TBCCW System is a corrosion inhibiting chemical treatment system designed for intermittent injection of a chemical solution into the demineralized water contained within the system.

The purpose of the TBCCW System is to remove heat from the following loads during all modes of reactor operation: Reactor Recirculation System (reactor recirculation pump MG sets), Main Generator and Auxiliary System (stator winding liquid coolers, hydrogen coolers, generator bus heat exchanger), Main Turbine and Auxiliary System (turbine lube oil coolers), Main Condenser Air Extraction System (condenser vacuum pump exhauster cooler), Service Air System (air compressors and coolers), Condensate System (condensate pump motor coolers), Feedwater System (reactor feed pump lube oil coolers), Process Sampling System (final feedwater facility/thermal control unit, feedwater and main steam sample coolers), and Control Room HVAC (control room air conditioner). The TBCCW System accomplishes this by transferring heat from these loads to either the Circulating Water System (normal cooling water supply to TBCCW heat exchangers) or the Service Water System (alternate cooling supply to TBCCW heat exchangers) through the TBCCW heat exchangers. Except for TBCCW flow to the hydrogen coolers, all system valving is manual. TBCCW flow to the hydrogen coolers is through an air operated valve that can be operated in a temperature regulated automatic mode or manual mode.

System Operation

The TBCCW System is comprised of pumps, heat exchangers, chemical addition equipment, a surge tank, and necessary controls and support equipment. Three parallel half capacity TBCCW pumps discharge to a common header which branches into the two half capacity TBCCW heat exchangers. Cooling water from the TBCCW heat exchangers flows to a common header and is distributed to the components cooled by the TBCCW System. Cooling water from the equipment being cooled flows into a common return header and is routed to the pump's suction. A surge tank is provided at the high point of the system and is sized to hold the expected maximum expansion of the TBCCW System. A bypass line is also provided from the pump discharge header to the heat exchanger discharge header to compensate for fluctuations in circulating water temperature.

The chemical treatment system is comprised of a mixing tank and a chemical feed pump. Water is drawn from the discharge header of the TBCCW pumps and the solution is injected upstream of the pumps in the common pump suction header.

For additional information, see UFSAR Section 9.2.1.

System Boundary

The license renewal scoping boundary of the TBCCW System encompasses the liquid-filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid-filled portions of the system located within the Turbine Building and Reactor Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scope of license renewal is the portion of the TBCCW System associated with the vacuum priming pump cooler and the Office Building Chiller. These portions of the TBCCW System are drained and abandoned in-place.

The TBCCW System is designed to be a backup cooling water supply for the Spent Fuel Pool Cooling System (augmented spent fuel pool cooling heat exchanger). However, this TBCCW function is only performed when the Reactor Building Closed Cooling Water (RBCCW) System is unavailable and the plant is shutdown. Therefore, this backup function is not considered an intended function for License Renewal.

Not included in the TBCCW System scoping boundary are the following interface systems, which are separately evaluated as license renewal systems:
Reactor Recirculation System
Main Generator and Auxiliary System
Main Turbine and Auxiliary System
Main Condenser Air Extraction System
Service Air System
Condensate System
Feedwater System
Process Sampling System
Control Room HVAC
Miscellaneous HVAC System
Spent Fuel Pool Cooling System
Fire Protection System

Reason for Scope Determination

The TBCCW System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during or following design basis events. The TBCCW System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The TBCCW System contains non-safety related water filled lines throughout the Turbine Building and the Reactor Building which have potential spatial interaction (spray or leakage) with safety related SSCs. - 10 CFR 54.4(a)(2)

UFSAR References

9.2
10.4
5.4
9.1

License Renewal Boundary Drawings

LR-BR-2006 sheet 4
LR-BR-2006 sheet 5
LR-GE-234R166
LR-GU-3E-551-21-1000
LR-JC-19479 sheet 3

Table 2.3.3.40 Turbine Building Closed Cooling Water System Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Coolers (Condensate Pump Motor)	Leakage Boundary
Coolers (Condenser Vacuum Pump)	Leakage Boundary
Coolers (Control Room AC)	Leakage Boundary
Coolers (Feedwater and Main Steam Sample)	Leakage Boundary
Coolers (Feedwater Pump Lube Oil)	Leakage Boundary
Coolers (Final Feedwater Facility)	Leakage Boundary
Coolers (Hydrogen)	Leakage Boundary
Coolers (Reactor Recirculation Pump M-G Sets)	Leakage Boundary
Coolers (Service Air Compressor Aftercooler)	Leakage Boundary
Coolers (Service Air Compressor Cylinders)	Leakage Boundary
Coolers (Service Air Compressor InterCooler)	Leakage Boundary
Coolers (Stator Winding Liquid)	Leakage Boundary
Coolers (Thermal Control Unit)	Leakage Boundary
Coolers (Turbine Lube Oil)	Leakage Boundary
Filter Housing	Leakage Boundary
Flexible Connection	Leakage Boundary
Flow Element	Leakage Boundary
Flow Glass	Leakage Boundary
Gauge Snubber	Leakage Boundary
Heat Exchangers (Generator Bus)	Leakage Boundary
Heat Exchangers (TBCCW)	Leakage Boundary
Level Glass	Leakage Boundary
Piping and fittings	Leakage Boundary
Pump Casing (TBCCW Pumps, Chemical Feed Pump)	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks (Surge, Chemical Mixing, Closed Cooling Water)	Leakage Boundary
Thermowell	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in Table 3.3.2.1.40 Turbine Building Closed Cooling Water System -Summary of Aging Management Evaluation

2.3.3.41 Water Treatment & Distr. System

System Purpose

The Water Treatment & Distr. System consists of the following subsystems: Pretreatment subsystem, Domestic Water (DW) and Domestic Water Distribution (DWD) subsystem, Makeup Demineralizer (MUD) subsystem and Demineralizer Water Transfer (WD) subsystem. The purpose of the Water Treatment & Distribution system is to be the source of all potable water, demineralized water and condensate for the station. It accomplishes this by drawing fresh water from a deep well and processing in the pretreatment system. After treatment, part of the water goes to the domestic water system and the rest is further treated in the Makeup Demineralizer System.

System Operation

Pretreatment Subsystem
The Pretreatment System is a trailer mounted system. The Pretreatment system is designed to filter the raw water that is drawn from the water well pit by the Deep Well Pumps. The pretreatment system consists of a fiberglass chemical tank, in which hypochlorite is injected upstream of two parallel filters. Chlorides and iron form ferric oxide floc which is removed by the filters. After passing through the filters the water is routed to either the clearwell tank or demineralizer trailer. The clearwell tank satisfies station demands for domestic water and makeup water. Three filtered water pumps remove the water from the clearwell tank. One pump operates as required to maintain the proper level in the Domestic Water Tank. The other two pumps are not automatic and operate in association with the MUD System.

The Pretreatment subsystem is not required to operate to support license renewal intended functions, and is not included in the scope of license renewal as this liquid filled subsystem is not located within an area in proximity of components performing a safety related function. Portions of this subsystem are located in the Pretreatment Building and Yard Area.

Domestic Water and Domestic Water Distribution Subsystems
The Domestic Water (MD) System is designed to provide a supply of fresh water for use by all site facilities including laundry, drinking fountains, kitchens, bathrooms, eye wash stations, decontamination showers, HVAC (Air washers and SEB Computer room), select sump pump bearing coolers, and the MUD system. The Domestic Water system consists of two subsystems, the Original Domestic water system and the North Yard domestic water system. The two subsystems are normally operated independently but can be cross connected to support shutdown of either subsystem for maintenance.

The Domestic Water Distribution System (DWD) system is designed to distribute potable water throughout the facility. The system consists of a water storage tank in the Pretreatment Building and in the North Yard Domestic Water Facility as well as electric hot water heaters in the Office Building, Plant Engineering Building, Site Emergency Building, New Site Administration Building and the Machine Shop. Additionally, it has a booster subsystem in the Maintenance Building and the Site Emergency Building.

A chemical feed subsystem treats the original domestic water prior to use. This system uses the differential pressure across the original Domestic Water Tank inlet isolation valve to provide the necessary driving force. The chemical feeder is filled with polyphosphate, a phosphate glass that dissolves slowly in water and serves to inhibit scale production, corrosion and red water formation in the domestic water piping. The North Yard Domestic Water facility has a water softener and adds soda ash to neutralize the ph to reduce corrosion and satisfy potable water standards. A Sodium Hypochlorite Injection System has been added to ensure that the North Yard Domestic Water System is bacteriologically sterile for human consumption and to oxidize and precipitate remaining dissolved iron and eliminate any traces of hydrogen sulfide. To ensure that any precipitated iron is removed a particulate filter is installed prior to distribution to the Domestic Water System. The original Domestic Water System also has a soda ash injection system, similar to the North Yard. Both tanks "float" on the domestic water distribution piping. Makeup water to the original tank is from the DWD System. Makeup water to the North Yard tank is from a deep well just north of the Domestic Water Facility. Water is automatically added as required to maintain levels in the tanks.

The main domestic water line for building services runs below grade from the pretreatment building to the turbine building basement. The North Yard Domestic Water Facility has a line that ties into the existing domestic water header north of the turbine building. Additionally a line is installed to directly supply the New Administration Building that also cross ties into the original Domestic Water System between the plant engineering and site emergency buildings. The North Yard System will be the designated source of potable water for the New Administration Building, however, it can also be lined up to supply other parts of the original system through either its north or south site tie-in points.

The Domestic Water and Domestic Water Distribution subsystems are not required to operate to support license renewal intended functions, but are included in the scope of license renewal as these liquid filled subsystems are located within an area in proximity of components performing a safety related function. Portions of this subsystem are located in the Turbine Building and Office Building.

Makeup Demineralizer Subsystem
The Makeup Demineralizer (MUD) system is designed to take pretreated water from the DW System and processes it to meet the high purity standards of water for makeup purposes. The original MUD system was replaced by a mobile demineralizer unit for purifying filtered well water before transfer to the demineralized water storage tank (DWST). The MUD System outflow is pumped to the DWST where it is stored until needed. The DWST is located outside the northwest corner of the Turbine Building, near the Condensate Storage Tank (CST).

This Makeup Demineralizer subsystem is not required to operate to support license renewal intended functions, but is included in the scope of license renewal as this liquid filled subsystem is located within an area in proximity of components performing a safety related function. Portions of this subsystem are located in the Turbine Building.

The Demineralized Water Transfer Subsystem
The Demineralized Water Transfer System is designed to provide the storage of demineralized water in the DWST and to supply an adequate amount of demineralized water for the following plant uses:

1. Initial fill up and makeup to: the Condensate Storage Tank, the Reactor Building Closed Cooling Water System, the Turbine Building Closed Cooling Water System, the Augmented Offgas Closed Cooling Water System, the New Radwaste Closed Cooling Water System, the Heating Boiler Deaerator, the Solid Radwaste System in the New Radwaste Building.

2. Supply of demineralized water to the chemical laboratory and the Maintenance Building.
3. Supply of demineralized water to the New Radwaste Building's Chemical Addition Tank, and personnel emergency shower and eyewash.
4. Cleaning and flushing via hose stations in the Turbine Building, Reactor Building, New and Old Radwaste Buildings, and Offgas Building.
5. System rinsing for the Solid Radwaste System in the New Radwaste Building.
6. Decontamination of the sampling stations.
7. Other miscellaneous uses.

The system consists of an outdoor storage tank (DWST), two full capacity transfer pumps, and associated piping and valves. Demineralized water from the MUD System enters the WD System at the DWST. Water is drawn from the tank through the WD pumps and into the system supply header. The pump suction line and the return line to the DWST are provided with locked open manually operated gate type block valves. These valves can be closed to mitigate the effects of leaks in any connecting pipe. The pump suction and return line are isolated from their surroundings by insulating tape wrap, and all flanges and penetrations which could contact dissimilar metals are also insulated. A cathodic protection system for buried piping, consisting of sacrificial anodes, is incorporated for corrosion protection. The DWST is electrically grounded, and is provided with an overflow line and a drain to the Turbine Building basement.

The WD System is normally kept in operation at all times. During loss of offsite power, either transfer pump may be started manually and operated from the Emergency Diesel Generators, if there is a demand on the system. There is no need to operate a transfer pump merely to fill the CST. During failure of normal auxiliary power, the DWST has enough reserve for anticipated requirements.

The WD subsystem is required to operate to support license renewal intended functions, and is included in the scope of license renewal as this liquid filled subsystem is located within an area in proximity of components performing a safety related function. Penetration X-23 will be assessed under License Renewal Structure Primary Containment. However V-12-217 and the piping on either side of the penetration up to the first flange connection on either side of the penetration will be assessed as part of water treatment and distribution for (a)(1) Primary Containment function. The removable spool piece and transition piece are installed for outage use only. The penetration is blind flanged on either side during normal operation.

Portions of this subsystem are located in the Reactor and Turbine Buildings.

For more detailed information, see UFSAR Section 9.2.3.

System Boundary

The license renewal scoping boundary of the Water Treatment & Distr. System encompasses the liquid filled portions of the system that are located in proximity to equipment performing a safety-related function. This includes the liquid filled portions of the Domestic Water and Domestic Water Distribution subsystem, Makeup Demineralizer subsystem and Demineralizer Water Transfer subsystem located within the Reactor, Turbine and Office Buildings. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawings for identification of this boundary, shown in red.

Penetration X-23 will be assessed under the License Renewal Structure Primary Containment. However V-12-217 and the piping on either side of the penetration up to the first flange connection on either side of the penetration will be assessed as part of the Water Treatment & Distr. System for (a)(1) Primary Containment function.

Components and subsystems that are not required to support the system's (a)(1) or leakage boundary intended functions are not included in the scope of license renewal. This includes the Pretreatment subsystem.

Not included in the Water Treatment & Distr. System scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Standby Liquid Control System (Liquid Poison System)
Condensate Transfer System
Reactor Building Closed Cooling Water System
Turbine Building Ventilation System
Sanitary Waste System
Main Condenser Air Extraction System
Reactor Building Ventilation System
Miscellaneous Floor and Equipment Drain System
Service Air System
New Radwaste Closed Cooling Water System
Turbine Building Closed Cooling Water System
Miscellaneous HVAC System
Radwaste System
Primary Containment Structure

Reason for Scope Determination

The Water Treatment & Distr. System is in scope under 10 CFR 54.4(a)(1) because portions of the system are safety related or relied on to remain functional during and following design basis events. The Water Treatment & Distr. System is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide primary containment boundary. 10 CFR 50.54(a)(1)
2. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The Water Treatment & Distr. System has the potential for spatial interaction with safety related equipment located in the vicinity to water filled process sampling piping. 10 CFR 54.4(a)(2).

UFSAR References

9.2.3
6.4.2.1

License Renewal Boundary Drawings

LR-BR-2004 sheet 1
LR-GU-3E-871-21-1000 sheet 1
LR-GU-3E-871-21-1000 sheet 2
LR-GE-148F723
LR-BR-2006 sheet 1
LR-BR-2006 sheet 5
LR-BR-2015 sheet 4
LR-GE-234R166

Table 2.3.3.41 Water Treatment & Distr. System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Filter Housing (including Purifier M-12-1)	Leakage Boundary
Flexible Hose	Leakage Boundary
Flow Element	Leakage Boundary
Flow Meter	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Restricting Orifice	Leakage Boundary
Tanks (including Hot Water Heater H-12-1)	Leakage Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.3.2.1.41 Water Treatment & Distr. System
-Summary of Aging Management Evaluation

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

The following systems are addressed in this section:

- Condensate System (Section 2.3.4.1)
- Condensate Transfer System (Section 2.3.4.2)
- Feedwater System (Section 2.3.4.3)
- Main Condenser (Section 2.3.4.4)
- Main Generator and Auxiliary System (Section 2.3.4.5)
- Main Steam System (Section 2.3.4.6)
- Main Turbine and Auxiliary System (Section 2.3.4.7)

2.3.4.1 Condensate System

System Purpose

The intended function of the Condensate System (CNDS) for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, Guidance on the Identification of Structures, Systems, and Components that meet 10 CFR 54.4(a)(2), dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The CNDS is designed to transfer sub-cooled condensate from the main condenser hotwell to the Feedwater System. It provides the ability to transfer condensate water from the Main Condenser, through the condensate demineralizer and supply the Reactor Feed Pump at a suitable pressure and required purity level. The CNDS includes the Condensate System and the Condensate Demineralizer System.

During normal plant operations, the purpose of the CNDS is to purify condensate by removing corrosion products, dissolved solids, chemicals and other impurities that may enter the reactor coolant cycle. The CNDS accomplishes this purpose by processing the condensate through demineralizers. In the likely event that station auxiliary power is available, the Condensate and Feedwater Systems provide additional emergency core cooling capability.

System Operation

The CNDS is comprised of three condensate pumps, steam packing exhauster, seven mixed bed demineralizer units (includes one spare), one recycle pump and the required piping, valves, instrumentation and controls. Demineralizer resins are no longer chemically regenerated and reused.

The CNDS begins with two lines from each of the three Main Condenser hotwells that discharge into a common condensate supply header. The condensate pumps take suction from the condensate supply header and discharge into a common header that branches to provide cooling flow to the three intercondensers and three aftercondensers (scoped in the Main Condenser Air Extraction System) of the steam jet air ejector (SJAE) units. These six condensers are arranged in parallel. Manually operated isolation valves are provided on the suction and discharge lines for each condensate pump, a check valve is provided on each condensate pump discharge line.

The three sets of inter/after condensers for the SJAE units are provided with motor operated isolation valves at their intake and discharge lines. The flow recombines downstream of the SJAE condensers, passes through the steam packing exhauster and enters the condensate demineralizers. Upstream of the demineralizers, a branch line is provided for demineralizer backwash and a branch line to condensate pump seals. Downstream of the demineralizers, branch lines are provided to the reactor feedwater pump seals, the low pressure turbine exhaust hood sprays, the condensate pump seals, the Control Rod Drive System and the Condensate Transfer System. The CNDS flow path ends at the inlet isolation valves of the Feedwater Heaters.

For additional information, see UFSAR Section 10.4.6, 10.4.7.

System Boundary

The license renewal scoping boundary of the Condensate System (CNDS) encompasses the liquid filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid filled portions of the CNDS located within the Turbine Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Components that are not required to support the system's leakage boundary intended function are not included in the scope of license renewal.

Not included in the CNDS scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Condensate Transfer System
Control Rod Drive System
Core Spray System
Instrument (Control) Air System
Feedwater System
Main Condenser Air Extraction System
Hydrogen Water Chemistry
Process Sampling

Reason for Scope Determination

The Condensate System (CNDS) is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The CNDS is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The CNDS has potential for spatial interaction with safety related equipment within the Turbine Building. 10 CFR 54.4(a)(2)

UFSAR References

10.1
10.4.6
10.4.7

License Renewal Boundary Drawings

LR-BR-2003 Sheet 1
LR-GE-148F444
LR-GE-148F437 Sheet 12
LR-JC-147434 Sheet 1

Table 2.3.4.1 Condensate System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Expansion Joint	Leakage Boundary
Filter Housing	Leakage Boundary
Flow Element	Leakage Boundary
Heat Exchangers	Leakage Boundary
Piping and fittings	Leakage Boundary
Pump Casing	Leakage Boundary
Restricting Orifice	Leakage Boundary
Sensor Element	Leakage Boundary
Sight Glasses	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks	Leakage Boundary
Thermowell	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.4.2.1.1 Condensate System
-Summary of Aging Management Evaluation

2.3.4.2 Condensate Transfer System

System Purpose

Condensate Transfer (CT) System is a condensate storage, makeup and supply system designed to distribute water to the Control Rod Drive, Core Spray, Condensate, Isolation Condenser, Reactor Water Clean Up, Spent Fuel Pool Cooling, Radwaste and the Heater, Drains and Vent and Pressure systems. The system is normally filled by the Demineralized Water Transfer System and has an emergency fill from the Fire Protection System. The system operates continuously during plant power operation and is credited to support Isolation Condensers for plant shutdown.

The purpose of the Condensate Transfer System is to provide for bulk storage of condensate, surge volume capability for the Condensate system, condensate supply for the condensate demineralizer resin transfer, flushing, resin regeneration and makeup to the Isolation Condensers and spent fuel pool. Condensate is also supplied by the CT system for pump bearing cooling in various systems and makeup supply for various plant systems. It accomplishes these features by continuously delivering condensate from the condensate transfer pumps to individual plant systems. It also provides a flow path between plant water supplies and various pumps and equipment when the appropriate manual or remote manual line-ups are made.

System Operation

The Condensate Transfer system is a normally operating condensate delivery system comprised of the Condensate Storage Tank (CST), condensate transfer pumps, condensate supply header and condensate branch lines that provide flow to various plant systems and components. It also is used to deliver water through its piping system to support various plant functions and it provides a surge volume for the Condensate System.

The CT system is relied on to provide a flow path for makeup to the Isolation Condensers through the Reactor Building header. This path allows makeup water from the CST via the CT pumps, backup source of makeup water from the Fire Protection system diesel and motor operated pumps and from the torus utilizing the Core Spray pumps. All these modes of operation utilize the same two air operated makeup control valves. When aligned to allow flow from the suppression pool through the Core Spray pumps to the Isolation Condensers, the Reactor Building header isolation valve is closed. The system is relied on to supply the Control Rod Drive System (CRDS) with condensate from the Condensate system directly or from the CST. The same transfer line supplies the Core Spray System. The CT system also provides makeup to the spent fuel pool.

The Condensate Transfer (CT) system consists of three basic flow paths. The condensate transfer pumps supply, the Condensate Storage Tank (CST) fill and transfer line and the CST to CRD and Core Spray suction line.

The condensate transfer pumps take suction from a common header supplied by the CST through the tank isolation valve. The water flows from the header into the individual pump suction lines and on to the pumps. The pumps then discharge to a common discharge header. Normally one pump operates continuously to supply system demands and the other pump is placed on standby. A recirculation line from the discharge of each pump directs a portion of the pumps discharge back to the CST. Recirculation flow is necessary during periods of low system demand to ensure that pump minimum flow requirements are met. Condensate from the combined pump discharge header exits the Condensate Transfer Building and flows to the Turbine, Reactor and Radwaste Buildings. Building branch lines from these headers supply systems and components with the required water. Flows to the Radwaste Buildings and Reactor Building are controlled by two manually operated butterfly valves. The two valves, located in the respective buildings, permit complete isolation of the loads in each building. Flow to the New Radwaste Building is from the header in the Old Radwaste Building and is controlled by a manually operated valve located in the Old Radwaste Building.

The CST provides bulk storage of condensate for use throughout the plant. Water for filling the CST is supplied from the Demineralized Water system or the Fire Protection system through a manually operated valve isolating the CST from the CST fill and transfer line. Since water from the Fire Protection system does not meet the purity requirements of condensate, filling the CST from the Fire Protection system is performed only in emergencies when no demineralized water is available and CST water is required to prevent uncovering the reactor fuel.

The CST to CRD and Core Spray suction line also provides the CRD System with condensate from the Condensate system directly or from the CST. The same line supplies the Core Spray System.

The condensate transfer pumps are controlled by individual pump control switches on a control room panel. Alternate controls and indicators for one of the transfer pumps are located on a local shutdown panel outside the north wall of the Chlorination Building. The Condensate Storage Tank is vented to the atmosphere. Tank level is indicated remotely on a control room panel and locally at the tank.

For additional information, see UFSAR Section 10.4.7.2.

System Boundary

The boundary of the CT pump supply path begins at the CST and continues down the suction header to the two parallel transfer pump suction lines and on through the pumps to the common discharge header. Both recirculation lines, all valves and in-line instruments are in included in the system boundary. The system continues through the main header in the Turbine Building and splits into the Reactor and Radwaste Building headers.

The Reactor Building header includes the piping up to the connections with the Core Spray fill and makeup valves and Fire Protection systems prior to terminating at the supply connection to the Isolation Condensers makeup lines. Off the header are additional piping that ends at the connections to the Reactor Water Clean Up and Spent Fuel Pool Cooling systems. The boundary also includes individual hose stations throughout the Reactor Building. The header into the Radwaste Buildings terminates at the connections to the Radwaste System. Small bore lines that branch off the header in the Turbine Building are in the boundary up to the connections to the Heater, Drains, Vent and Pressure Relief and Condensate systems. Included within the boundary are the individual hose stations throughout the Turbine Building.

The boundary of the CST fill and transfer line begins at the header connection to the CST continues through the fill lines and ends at the connection to the Fire Protection, Condensate and Demineralizer Water Transfer systems.

The boundary of the CST to CRD and Core Spray suction line begins at the CST and ends at the connections to the CRD, Core Spray and Condensate systems. The boundary also includes the CRD recirculation line up to the connection to the CRD system and the instrumentation to the CST. The CST and its vent and overflow lines are contained within the scoping boundary.

Not included in the Condensate Transfer System scoping boundary are the Control Rod Drive, Core Spray, Condensate, Isolation Condenser, Reactor Water Clean Up, Spent Fuel Pool Cooling, Radwaste, Fire Protection, Demineralized Water Transfer and the Heater Drains, Vent and Pressure Relief systems which are separately evaluated as their own license renewal systems.

The portion of the CT System in scope for license renewal includes the CST, the CT pumps, instrumentation and all piping to the CT Isolation Condenser makeup valves, the connections to the Core Spray pump discharges and Fire Protection System and the connection with the spent fuel pool. Also included are the CST fill and transfer line, the CRD and Core Spray suction line and the CRD recirculation line.

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

The piping downstream of the radwaste header isolation valve supplying the Radwaste System is not required to support intended functions. This portion of the CT System is not included within the scope of license renewal. The overflow piping from the connection to the CST is not required to support intended functions and is not with the scope of license renewal.

<u>Reason for Scope Determination</u>

The Condensate Transfer System meets 10 CFR 54.4(a)(1) because it is relied on to remain functional during and following design basis events. It does meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48) and SBO (10 CFR 50.63). The Condensate Transfer System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Remove residual heat from the reactor coolant system. Supports makeup to the Isolation Condensers by use of CT piping and Isolation Condenser makeup valves. Supports Core Spray by maintaining system pressure boundary with closed Core Spray fill and makeup valves. 10 CFR 54.4(a)(1)
2. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The CT system provides makeup to the spent fuel pool. The CT system has potential for spatial interaction with safety related equipment within Turbine Building and Reactor Building. 10 CFR 54.4(a)(2)
3 Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). Supports makeup to the Isolation Condensers by use of CST, Core Spray pump connections, fire protection connection and CT piping and Isolation Condenser makeup valves and makeup to the Reactor Vessel from CST through CT piping to CRD. 10 CFR 54.4(a)(3)
4 Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). Supports makeup to the Isolation Condensers by use of CST, CT pumps and piping, fire protection connection and Isolation Condenser makeup valves and permits makeup to the Reactor Vessel from CST and Condensate System through CT piping to CRD. 10 CFR 54.4(a)(3)

UFSAR References

10.4.7
7.4
6.3
15.2.6
9.1

License Renewal Boundary Drawings

LR-BR-2004 sheet 1
LR-BR-2004 sheet 2
LR-BR-2003
LR-BR-2007 sheet 2
LR-BR-2007 sheet 3
LR-JC-19479 sheet 3
LR-JC-147434 sheet 1
LR-GE-885D781
LR-GE-237E487
LR-GE-237E756
LR-GE-148F444

Table 2.3.4.2 **<u>Condensate Transfer System</u>**
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Expansion Joint	Pressure Boundary
Flow Element	Leakage Boundary
	Pressure Boundary
Gauge Snubber	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing	Pressure Boundary
Restricting Orifice	Leakage Boundary
	Pressure Boundary
	Throttle
Tanks	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.4.2.1.2 Condensate Transfer System
-Summary of Aging Management Evaluation

2.3.4.3 Feedwater System

System Purpose

The Feedwater System (FS) is a reactor water level control system that provides reheated condensate water to the Reactor Pressure Vessel (RPV) during normal operation. It provides water to the reactor at a flow rate equivalent to what is being generated into steam by boil-off and removed by the main steam system. The FS is essential for power operations.

The FS provides cooling water to the core during a Loss of Coolant Accident (LOCA) but is not credited in the accident analyses and is not considered part of the Emergency Core Cooling System (ECCS) or credited to support safe shutdown.

The FS includes the Feedwater Control System, the Reactor Feed Pump Lube Oil System, and the Zinc Injection System.

System Operation

The Feedwater System (FS) is comprised of three separate feedwater heating strings, and has been sized with three one-third capacity Reactor Feedwater Pumps (RFP). All three RFPs need to be in service during normal full load operation. Each string contains a drain cooler, Low Pressure (LP) heater, Intermediate Pressure (IP) heater, Reactor Feedwater Pump (RFP), flow element and High Pressure (HP) heater. The system also includes the required piping, valves, instrumentation and controls.

The RFPs take suction on a common header upstream of the drain coolers. The normal flowpath is through the drain cooler, LP heater tubes, IP heater tubes, RFP, RFP discharge check valve, regulating valve and heater string flow element. Flow then goes through the HP heater tubes and heater string outlet valve into a common header. Flow continues through a total feedwater system flow element then splits into two lines with an outboard isolation check valve, one inboard isolation check valve, and an inboard manual isolation valve for each line. Finally feedwater flow is directed into the reactor vessel (evaluated with the Reactor Pressure Vessel). The shell side of the heaters receives turbine extraction steam and heater drains to preheat the condensate (evaluated with the Main Turbine and Auxiliary System) prior to delivery to the RPV.

The Feedwater Control System is a digital control function of the FS. Reactor water level is controlled by positioning the Low Flow Regulating Valves (LFRVs) or the Main Feedwater Regulating Valves (MFRVs) to control feedwater flow rate to the reactor vessel. The digital control system consists of two computers with dual links to the digital controllers. The computers contain the feedwater logic software. It uses redundant, calculated and then default inputs to ensure reliability.

Each pump has a minimum flow line, for pump protection, routed from the discharge of the reactor feed pump to each condenser shell. The Hydrogen Water Chemistry System connects at the suction side of the RFP's and injects gaseous hydrogen into the Feedwater System in order to suppress the dissolved oxygen in the reactor coolant by promoting the recombination of hydrogen and oxygen back into water.

The Zinc Injection System is provided to reduce the deposited activity and shutdown dose rates in reactor coolant system piping and components by injecting depleted zinc oxide into the reactor coolant system. The Zinc Injection System uses the differential pressure between the discharge and the suction of the "A" Feedwater Pump as its driving force. Flow is taken from the discharge side of the "A" Feedwater Pump, is routed through a dissolution column containing depleted zinc oxide pellets, and returned to the suction side of the "A" Feedwater Pump. The Zinc Injection System is comprised of a dissolution vessel, a local instrument panel, manual flow control valves, manual system isolation valves and associated piping. Operation of the Zinc Injection System is through manual valves and requires that the A Feedwater Pump is in service. Manual flow control valves are adjusted as necessary to achieve the desired reactor water and feedwater zinc concentrations as determined by Chemistry.

Feedwater is supplied to spargers (evaluated with the Reactor Internals) at four points, 90 degrees apart. These spargers distribute feedwater in a manner that prevents feedwater spray directly on the reactor vessel wall, which minimizes thermal stressing. Each feed pump has a RFP Lube Oil System that consists of a shaft-driven oil pump, motor-driven auxiliary oil pump, reservoir and filter cooler. Cooling water is supplied to the lube oil coolers from the Turbine Building Closed Cooling Water (TBCCW) System.

For additional information, see UFSAR Section 7.7, 10.1, 10.4.7, 15.1 & 15.2.

<u>System Boundary</u>

The Feedwater System (FS) begins at the inlet to the drain coolers and ends with the reactor feedwater connection at the Reactor Pressure Vessel (RPV) nozzles (evaluated with the Reactor Pressure Vessel System). The system includes drain coolers, LP heaters, IP heaters and the reactor feedwater pumps. Downstream of each pump is a regulating valve, flow element and then the tube side of the HP heater in each string. The reactor feed pump discharge feedwater flow element is considered part of the feedwater control system and evaluated as part of the feedwater system. The three strings combine into a common header downstream of the HP heater outlet valves. A total system flow element exists in the common header. Four lines penetrate the RPV and direct feedwater to the reactor via feedwater spargers (evaluated with the Reactor Internals). All associated piping, components and instrumentation contained within the flowpath described above are included in the system evaluation boundary.

Also included in the license renewal scoping boundary of the FS are those portions of nonsafety-related piping and equipment that extend beyond the safety-related/nonsafety-related interface up to the location of the first seismic anchor, or to a point no longer in proximity to equipment performing a safety-related function, whichever extends furthest. This includes the nonsafety-related portions of the system located within the Turbine Building. Included in this boundary is the Depleted Zinc Injection Skid and other pressure retaining components relied upon to preserve the leakage boundary intended function of the FS. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Not included in the scoping boundary are the following interfacing systems that are separately evaluated as license renewal systems:
Main Turbine and Auxiliary System
Turbine Building Closed Cooling Water System
Reactor Pressure Vessel

Reactor Internals
Condensate System
Hydrogen Water Chemistry System

Reason for Scope Determination

The Feedwater System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The Feedwater System meets 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is in scope under 10 CFR 54.4(a)(3) because it is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48). The Feedwater System is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The FS has potential for spatial interaction with safety related equipment within Turbine Building. 10 CFR 54.4(a)(2)
2. Provide reactor coolant pressure boundary. 10 CFR 54.4(a)(1)
3. Provide primary containment boundary. Piping for the feedwater system exits the containment and has a check valve outside containment. 10 CFR 54.4(a)(1)
4 Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 50.54(a)(3).

UFSAR References

7.6.1.1
7.7.1.4
10.1
10.4.7
15.1

License Renewal Boundary Drawings

LR-BR-2003

Table 2.3.4.3 Feedwater System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Dissolution Column	Leakage Boundary
Expansion Joint	Leakage Boundary
Filter Housing	Leakage Boundary
Flow Element	Leakage Boundary
	Pressure Boundary
Heat Exchangers	Leakage Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Pump Casing	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks	Leakage Boundary
Thermowell	Leakage Boundary
	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary

The aging management review results for these components are provided in
Table 3.4.2.1.3 Feedwater System
-Summary of Aging Management Evaluation

2.3.4.4 Main Condenser

System Purpose

The Main Condenser is a heat sink for the turbine exhaust steam, turbine bypass steam, and other flows. It also deaerates and stores the condensate for reuse after a period of radioactive decay. Additionally, the main condenser provides for post accident containment, holdup and plateout of main steam isolation valve (MSIV) bypass leakage.

The Main Condenser is designed:

a. To accept a portion of turbine bypass steam flow without exceeding the turbine exhaust pressure and temperature limitations.
b. To receive, in addition to the main turbine exhaust, vents and drains from the regenerative feedwater heating system and from various other components and systems of the heat cycle.
c. To provide time for radioactive isotope decay by retaining sufficient water in the hotwell, without makeup and with turbine throttle valves wide open.

The purpose of the system is to condense Low Pressure (LP) turbine exhaust from each of the LP turbines and allow for the decay of short-lived isotopes. The main condenser accomplishes this by transferring heat to the circulating water system and by ensuring sufficient retention time in the hotwell to allow for the decay of short lived isotopes.

System Operation

The Main Condenser is comprised of three single pass shells, with divided waterboxes, one each for the three low pressure (LP) sections of the main turbine. Each shell is rigidly supported on a concrete foundation and is connected to the corresponding LP turbine cylinder casing by means of an expansion joint.

Equalizing connections between condenser shells limit the pressure differential between adjacent shells. These connections also allow use of one single vacuum breaker for all three shells.

During normal operation, steam, after expanding through the LP turbine, exhausts directly downward, through exhaust openings in the turbine casings into the condenser shells. The steam passes over the outside of the tubes and forms condensate that enters the hotwell and flows to the suction of the condensate pumps. The inside of the tubes have water from the Circulating Water System passing through them for heat rejection. The Circulating Water System has divided waterboxes, each provided with inlet and outlet circulating water valves, permitting individual operation, removal from service of one half shell for maintenance, or backwashing of either half shell. The steam packing exhauster and the steam jet air ejectors are provided to obtain the minimum vacuum that will prevent steam from leaking past the packing and into the turbine building.

During abnormal conditions, the Main Condenser receives, although not simultaneously, flows from the Turbine Bypass System, feedwater heater drains, and relief valve discharges from various steam lines. There are also other intermittent flows into the Main Condenser, such as condensate and reactor feedwater pumps minimum recirculation flows.

Makeup from the Condensate Storage Tank is evenly divided between the operating condenser shells. At each condenser, a line supplies make-up to a spray nozzle at the elevation of the drain coolers. Makeup thus enters the steam space to ensure deaeration before it mixes with condensate in the hotwell.

The condenser shells and turbine casings are protected by relief diaphragms, which will open in the event of failure of a turbine bypass valve to close on loss of condenser vacuum. The steam released from a ruptured diaphragm is discharged to the local area and then to the Turbine Building stack through the ventilating system.

Hotwell level is monitored and alarms are provided for both low and high level. Local temperature indication is also provided. Condenser vacuum is indicated in the control room. Vacuum pressure monitors provide alarm and trip signals to the main turbine and for the turbine bypass valves for loss of vacuum.

There are generally two types of valve trip events which can occur at the Oyster Creek Generating Station. The first will trip closed the main stop valves, reheat stop valves, main control valves, intercept valves, and extraction check valves and opens the bypass valves to provide a flow path of reactor steam through the bypass valve assembly to the Main Condenser. The second type of valve trip will close the bypass valves on low condenser vacuum, thereby protecting against an overpressurization of the Main Condenser. Bypass trip oil is used to actuate the bypass valve trip, independent of the turbine trip oil, via the bypass valve relay.

Air can be removed from the Main Condenser by a mechanical vacuum pump (evaluated with the Main Condenser Air Extraction System), which discharges to the gland seal holdup pipe and through the plant stack. This pump is used for evacuating the condenser during plant startup and for purging the condenser after plant shutdown.

Oyster Creek has made revisions to its LOCA accident source term in design basis radiological consequences analyses, but has not yet submitted a license amendment application under 10CFR50.67 for other accidents. The Main Condenser and portions of the Main Steam system are credited for radiological plate out and holdup for the Control Rod Drop Accident (CRDA). For the purpose of CRDA, it is not required that the condenser be safety related per SRP 15.4.9.

Components of the condensate and condensate storage system, condensate demineralizer subsystem, main steam, mechanical vacuum pumps, steam jet air ejector subsystem, turbine bypass subsystem and the circulation water system are evaluated with their respective license renewal systems.

Due to the location of the condenser in the Turbine Building any flooding resulting from circulating water side or steam side condenser failure will not affect the operation of any safety related equipment.

For more detailed information, See UFSAR section 10.4.1 and 10.4.2.2.

<u>System Boundary</u>

The boundary of the main condenser begins with the low-pressure turbine exhaust inlets and includes the main steam drain line inlets and ends at the condenser hotwell. The boundary includes the main condenser shell, condenser tubes and waterboxes.

Not included in the Main Condenser are the following interfacing systems, which are separately evaluated as license renewal systems:
Condensate System
Feedwater System
Condensate Transfer System
Main Steam System
Main Condenser Air Extraction System
Main Turbine and Auxiliaries
Circulating Water System

Reason for Scope Determination

The Main Condenser System does not meet 10 CFR 54.4(a)(1) because it is a non-safety related system and is not relied upon to remain functional during or following a design basis event. The Main Condenser System meets the scoping requirements of 10 CFR 54.4(a)(2) because it is relied on for post accident containment, holdup and plateout of MSIV bypass leakage. It does not meet 10 CFR 54.4(a)(3) since it is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Post accident containment holdup and plate out of MSIV bypass leakage. The main condenser provides for post accident containment, holdup and plateout of MSIV bypass leakage. 10 CFR 54.4(a)(2)

UFSAR References

10.4.1

License Renewal Boundary Drawings

LR-BR-2002 Sheet 2
LR-BR-2002 Sheet 3
LR-BR-2002 Sheet 4
LR-BR-2003
LR-BR-2005 Sheet 6
LR-BR-2007 Sheet 1
LR-BR-2007 Sheet 2
LR-BR-2008 Sheet 1

Table 2.3.4.4 Main Condenser
Components Subject to Aging Management Review

Component Type	Intended Functions
Main Condenser Shell	Containment, Holdup and Plateout
Main Condenser Tubes	Containment, Holdup and Plateout
Main Condenser Tubesheet	Containment, Holdup and Plateout

The aging management review results for these components are provided in
Table 3.4.2.1.4 Main Condenser
-Summary of Aging Management Evaluation

2.3.4.5 Main Generator and Auxiliary System

System Purpose

The intended function of the Main Generator and Auxiliary Systems (MGAS) for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2), dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The MGAS is a normally operating system designed to convert the mechanical energy of the turbine into electrical energy, which is fed to the main transmission lines, and is also used to satisfy in-house loads. The MGAS system is comprised of the following subsystems: Main Generator, Main Generator Exciter, Stator Cooling, Hydrogen Cooling, Hydrogen Seal Oil and the generator Isolated Phase Bus.

The purpose of the MGAS is to produce electricity. The system accomplishes the generation of electricity by converting mechanical energy, supplied by the main turbine, into electrical energy. The electrical energy produced by the main generator is transmitted to the power system grid via the main transformers, and to station loads via the auxiliary transformer.

System Operation

The Main Generator consists of a casing, rotor and stator. The casing forms a gas tight boundary. The rotor consists of the rotor body with two shaft extensions. Hydrogen flows into the rotor near each retaining ring to cool the copper windings. Two axial blower type fans, one at each end of the rotor, provide the circulation of cooling hydrogen gas around the generator and through the coolers. The stator contains the armature windings for the Main Generator. It consists of the stator core and stator windings. The stator windings are direct-water cooled by Stator Cooling Water. The Stator Cooling Water removes heat produced in the stator bars of the Main Generator. Without cooling, output must be reduced. Stator Cooling Water uses the Turbine Building Closed Cooling Water System as the heat sink.

The Main Exciter supplies the Main Generator field with excitation voltage through slip ring/brush rigging arrangement and the main exciter output circuit breaker. The main exciter is an air-cooled, DC generator driven by a reduction gear connected to the main generator rotor through a flexible coupling. The magnitude of the exciter output, and thus generator main field excitation, is controlled by a motor-driven rheostat or by an amplidyne.

The Hydrogen Seal Oil subsystem maintains the hydrogen inside the generator casing. Seal oil seals the Main Generator casing to prevent the hydrogen gas from exiting to the atmosphere at the points where the rotor penetrates the casing.

Regulating the field applied to the main exciter changes the field applied to the rotor and controls output voltage. A motor operated rheostat in series with the exciter field accomplishes manual regulation. An Amplidyne voltage regulator provides automatic regulation. The high voltage bushings connect the generator phases to the isolated phase buses. The isolated phase bus connects the main generator to the main transformers, auxiliary transformer, and generator neutral connection.

For more detailed information, see UFSAR Sections 8.2, 9.2.1.6, 10.2.

System Boundary

The license renewal scoping boundary of the Main Generator and Auxiliary Systems (MGAS) encompasses the liquid-filled portion of the system that is located in proximity to equipment performing a safety-related function. This includes the liquid-filled portions of the system located within the Turbine Building. Included in this boundary are pressure-retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Components that are not required to support the system leakage boundary intended function are not included in the scope of license renewal. These include the main generator, main generator exciter, hydrogen cooling and generator isolated phase bus.

Not included in the MGAS scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Turbine Building Closed Cooling Water System
Main Turbine and Auxiliary System
Main Steam System
Water Treatment & Distribution System

Reason for Scope Determination

The Main Generator and Auxiliary System (MGAS) is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The MGAS is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The MGAS has potential for spatial interaction with safety related equipment within Turbine Building. 10 CFR 54.4(a)(2)

UFSAR References

8.1.2
8.2.1
8.3.1.1
9.2.1
10.2.2

License Renewal Boundary Drawings

LR-GE-234R166
LR-GE-865D741

Table 2.3.4.5 Main Generator and Auxiliary System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Filter Housing	Leakage Boundary
Flow Element	Leakage Boundary
Gauge Snubber	Leakage Boundary
Heat Exchangers	Leakage Boundary
Piping and fittings	Leakage Boundary
Pump Casing	Leakage Boundary
Restricting Orifice	Leakage Boundary
Sensor Element (CE)	Leakage Boundary
Sight Glasses	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.4.2.1.5 Main Generator and Auxiliary System
-Summary of Aging Management Evaluation

2.3.4.6 Main Steam System

System Purpose

The Main Steam System (MSS) is a normally pressurized system that is designed to deliver steam generated from the Reactor Pressure Vessel System to the Main Turbine and Auxiliary System. The MSS is in scope for License Renewal.

The purpose of the MSS is to provide a primary containment and reactor coolant pressure boundary function; it serves as the pressure relief system, and is a steam distribution system. It accomplishes the primary containment and reactor coolant pressure boundary function by utilizing piping and valves to limit radiation release rates from the primary Containment below the 10CFR100 guidelines. It accomplishes the pressure relief function for the reactor coolant pressure boundary by way of automatic and manual actuation of relief valves. It also provides manual and automatic emergency depressurization by way of relief valves to support the Core Spray System. Distribution of steam to the Main Turbine and Auxiliary System is accomplished by piping distribution branches in the turbine building.

System Operation

The system is comprised of both small bore and large bore piping, pneumatically actuated isolation valves, spring type safety valves, electrically actuated relief valves, and vacuum breaking check valves to accomplish its designed functions. The MSS transports steam generated by the reactor through the reactor pressure vessel nozzles to the main turbine via Main Steam Isolation Valves (MSIVs) in each of the two main steam lines. Two main steam lines each attached to a reactor vessel nozzle have branch connections on the main steam line for safety relief valves (SRVs), and electromatic relief valves (EMRVs). Integral with the piping in the primary containment are flow restrictors inside the piping along with sensing lines to monitor differential pressure. Two isolation valves on each steam line, one inside and one outside of primary containment, provide primary containment and reactor coolant boundary requirements. The two main steam lines terminate at an equalization header in the Turbine Building which distributes the steam to the Main Turbine and Auxiliary Systems including the turbine stop valves, turbine bypass valves, turbine steam seals, and steam jet air ejectors.

The Main Steam System provides the pressure relief function with the nine SRVs installed on the main steam lines on the branch connections. When actuated, the SRVs discharge steam to the drywell. The SRVs are spring-type safety valves sized and provided with set points which maintain reactor vessel pressures within design conditions.

The main steam lines have five EMRVs, which provide a pressure relief function actuated by way of pressure switches in the Automatic Depressurization System (evaluated with the Automatic Depressurization System). In addition they are automatically or manually actuated by the Automatic Depressurization System to depressurize the reactor vessel to support the Core Spray System in an emergency depressurization function. The EMRVs open to discharge the steam to the pressure suppression chamber (evaluated with the Primary Containment Structure).

Integral with the main steam line piping are flow restrictors on each steam line inside the drywell. The flow nozzles provide a differential pressure which is sensed through small diameter piping leading to pressure and flow instrumentation systems evaluated with the

Nuclear Boiler Instrumentation System, which provide indication and alarm for main steam line flow rate during normal and transient conditions. Actuation of safety signals on high flow is provided to the Reactor Protection System. The flow restrictors limit the maximum possible flow through the steam lines and in conjunction with the MSIVs limit the loss of reactor coolant, reduce the amount of moisture carryover, and reduce the possibility of forming high velocity water slugs in the main steam lines during a postulated severance of the main steam line outside the drywell.

The MSIVs are pneumatic piston actuated valves, utilizing Instrument (Control) Air System and the Nitrogen Supply System to assist closing the valves when required. The valves are provided automatic isolation signals to close from the Reactor Protection System, and manual actuation from the control room. Solenoid valves powered from both the 125 V Station DC and the 120 VAC Vital Power Systems operate the valves. The MSIV's have position sensing switches as part of the Reactor Protection System to provide a reactor scram on sensed start of closure of the valves.

One of the main steam lines downstream of the MSIV provides the vent path for the Isolation Condenser vents.

Sensing lines and condensing pots for the main steam line low pressure sensors are downstream of the MSIVs to sense a main steam line break and provide a signal for closure of the MSIVs.

The turbine bypass valves provide a reactor pressure control function, turbine steam seals minimize air in leakage to the main condenser, and the Steam Jet Air Ejector (SJAE) steam supply provides motive force for the air extraction function, none of which are relied upon to provide a safety function.

Under post accident conditions the piping and components downstream of the MSIVs provides containment, holdup, and plate out for MSIV bypass leakage.

Oyster Creek has made revisions to its LOCA accident source term in design basis radiological consequences analyses, but has not yet submitted a license amendment application under 10CFR50.67 for other accidents. The Main Condenser and portions of the Main Steam system are credited for radiological plate out and holdup for the Control Rod Drop Accident (CRDA).

Draining of the main steam lines is accomplished by the drain lines routed to either the Drywell Floor and Equipment Drains System or the Main Condenser System.

Piping is installed on the reactor vessel head, and connected to the main steam lines to provide venting of non-condensable gases from the reactor vessel during operation. Another branch connection off the reactor vessel head vent line provides steam to the wide range level indication condensing pot within the Nuclear Boiler Instrumentation System. Another branch connection with solenoid operated isolation valves provides a vent path for the reactor vessel to the Drywell Floor and Equipment Drains System.

For more detailed information, see UFSAR Sections, 5.2, 5.4, 6.3, 7.3, 10.3, 15.1,15.2

System Boundary

The Main Steam System begins with the two parallel pipes each connected to a reactor vessel nozzle, proceeds through the drywell and drywell penetrations into the turbine building, and terminates at the connections to the main turbine stop valves and bypass valves via an equalization header and at other main turbine auxiliaries. Each main steam line is equipped with safety valves, EMRVs, and flow restrictor, followed by an MSIV inside and outside the primary containment. The evaluation boundary includes piping between the reactor pressure vessel and the outboard isolation valve, including the main steam line drain piping. Included is discharge piping from the EMRV valves, which is routed through the drywell, the pressure suppression chamber (Torus) vent header, and terminates at the quencher located in the pressure suppression chamber (Torus). Included in the MSS is the reactor vessel head vent beginning at the reactor head nozzle pipe- to-nozzle weld and terminating at the main steam piping, the head vent piping to the Drywell Floor and Equipment Drains System terminating at the second reactor head vent isolation valve, and head vent piping terminating at the condensing pot for the wide range level instrument in the Nuclear Boiler Instrumentation System. Included is the branch connection from the main steam line for the Isolation Condenser System vents up to the manual isolation valve. Included is the piping to the main turbine stop valves, main turbine bypass valves, steam seal regulator, and SJAEs, steam supply isolation valves; all downstream of the MSIVs in the turbine building. All associated piping, components, and instrumentation contained within the flow path described above are included in the system evaluation boundary.

Not included in the scoping boundary are the EMRV solenoids, and associated logic and power evaluated as part of the Automatic Depressurization System. Not included in the scoping boundary is the instrumentation associated with the monitoring of leakage from EMRV and safety valves, which is included in the evaluation of Post Accident Monitoring System. Not included in the Main Steam System license renewal scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems: Nuclear Boiler Instrumentation, Drywell Floor and Equipment Drains, Automatic Depressurization System, Instrument (Control) Air System, Nitrogen Supply System, Post- Accident Monitoring System, and Main Turbine and Auxiliary System.

The boundary portion of the MSS that is in scope for license renewal starts at the reactor vessel nozzle, and ends with the main turbine stop valves, the SJAEs, the main turbine bypass valves, and the seal steam pressure regulator. It includes the EMRVs and safety valves as branches to the piping internal to the primary containment.

Reason for Scope Determination

The Main Steam System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4 (a)(2) because failure of non-safety related portions of the system could prevent accomplishment of function(s) identified for 10 CFR 54.4 (a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform functions that demonstrate compliance with the Commission’s regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49). The Main Steam System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission’s regulation for ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63)

System Intended Functions

1. Provide reactor coolant pressure boundary. 10 CFR 54.4 (a)(1)
2. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. 10 CFR 54.4 (a)(1)
3. Provide primary containment boundary. 10 CFR 54.4 (a)(1)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4 (a)(3)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4 (a)(3)
6. Provides emergency core cooling where the equipment provides coolant directly to the core. Works in concert with Core Spray System to provide injection following a LOCA. 10 CFR 54.4 (a)(1)
7. Post accident containment holdup and plate out of MSIV bypass leakage. The main steam lines and drains provide for post accident containment, holdup and plateout of MSIV bypass leakage. 10 CFR 54.4 (a)(2)
8. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The system has spatial relationship with safety-related SSCs such that its failure could adversely impact performance of an intended function. 10 CFR 54.4(a)(2)

UFSAR References

5.2.2
5.2.6.2
5.4.4
5.4.5
6.3.1.2
7.3
10.3
15.1.5

License Renewal Boundary Drawings

LR-BR-2002, Sheet 1
LR-BR-2002, Sheet 2
LR-BR-2008, Sheet 1
LR-GE-148F712
LR-GE-713E802
LR-JC-19616

Table 2.3.4.6 Main Steam System
Components Subject to Aging Management Review

Component Type	Intended Functions
Closure bolting	Mechanical Closure
Condensing chamber	Pressure Boundary
Coolers (Sample)	Pressure Boundary
Eductor	Leakage Boundary
Expansion Joint	Pressure Boundary
Flow Element (Main Steam Line)	Pressure Boundary
	Throttle
Gauge Snubber	Pressure Boundary
Piping and fittings	Leakage Boundary
	Pressure Boundary
Sparger (Y-Quencher)	Pressure Boundary
Steam Trap	Leakage Boundary
	Pressure Boundary
Strainer Body	Leakage Boundary
Thermowell	Pressure Boundary
Valve Body	Leakage Boundary
	Pressure Boundary
Valve Body (Bypass Valves)	Pressure Boundary
Valve Body (Steam Chest)	Pressure Boundary

The aging management review results for these components are provided in
Table 3.4.2.1.6 Main Steam System
-Summary of Aging Management Evaluation

2.3.4.7 Main Turbine and Auxiliary System

System Purpose

The intended function of the Main Turbine and Auxiliary Systems (MTAS) for license renewal is to maintain leakage boundary integrity to preclude system interactions as described in ISG-09, Guidance on the Identification of Structures, Systems, and Components that meet 10CFR54.4(a)(2), dated March 15, 2002. For this reason, this system's pressure retaining components located in proximity to other components performing safety-related functions have been included in the scope of license renewal. This system is not required to operate to support license renewal intended functions, and is in scope for potential spatial interaction.

The MTAS is a normally operating system designed to convert the thermodynamic energy of reactor steam into rotational mechanical energy to drive the Main Generator.

The Main Turbine and Auxiliary Systems (MTAS) consists of the following subsystems. These subsystems are: Main Turbine (High and low pressure turbine sections), Mechanical-Hydraulic Controls Front Standard, Heater Drains, Vent and Pressure Relief, Moisture Separators, Reheaters, Turbine Lubrication Oil, Lubrication Oil Purification and Transfer, Steam Seal, Turning Gear and Lift Pumps, Exhaust Hood Spray and Turbine Hood Spray, Reheat Steam, Turbine Extraction, Turbine Bypass System and the necessary control and protective devices, operating and supervisory instrumentation.

The purpose of the MTAS is to produce rotational energy from the steam generated in the reactor, and to discharge exhaust steam into the main condenser.

The system accomplishes the purpose by extracting energy from the reactor steam entering the High Pressure (HP) turbine through the Main Stop Valves and Control Valves. Some of the steam is extracted and sent to the first stage reheater. The remaining steam exhausts to the moisture separators and then to the reheaters. Superheated steam from the reheaters is directed to the Low Pressure (LP) turbines through the Combined Reheat Intercept/Stop Valves. From there the steam is exhausted to the Main Condenser (evaluated as a separate system for license renewal).

System Operation

The MTAS is comprised of one high and three low pressure turbine sections, stop valves, control valves, combined reheat valves, drain tanks, flash tanks, control and protective devices, operating and supervisory instrumentation and associated support equipment. The turbine is of conventional design for saturated steam conditions; it consists of a double flow high pressure section followed by three double flow low-pressure sections, each served by a separate divided water box condenser.

The system begins downstream of the main turbine stop valves in the steam chest that direct saturated steam from the Main Steam System through control valves to the high-pressure turbine section. Steam from the high-pressure section exits into the moisture separators, where steam drying occurs. Downstream of the Moisture Separators, steam for heating the Feedwater and first stage reheater is supplied from turbine extractions. The Reheat System dries the steam leaving the high-pressure turbine and superheats the steam before it enters the low-pressure stages. The first stage reheaters handle the flow from the Moisture

Separators. The first stage reheater is heated by steam from the third stage extraction of the high-pressure turbine. Steam from the first stage reheaters flows into the second stage reheaters. The second stage reheaters are heated with steam from the steam chest.

After being reheated, the steam from each second stage reheater is admitted to the center sections of the three low pressure turbines by way of three pairs of combined reheat intercept stop valves. The extraction steam lines from each of the turbine low-pressure stages provide steam to the shell side of three parallel strings of feedwater heaters. Cascading drains from the reheaters and moisture separators drain tank also go into three parallel strings of the feedwater heaters.

Normally, the turbine utilizes all the steam being generated by the reactor. However, under certain operating transients, excess steam is generated. An automatic pressure controlling Turbine Bypass System is provided to discharge excess steam up to 40 percent of the turbine steam flow at design power level directly to the main condenser. The Turbine Bypass System is designed to control pressure by dumping excess steam during startup, shutdown, and during power operation, when the reactor steam generation exceeds the transient turbine steam requirements.

The feedwater heaters are shell and tube type heat exchangers with reactor feedwater flowing through the tube side and the cascading drains on the shell side. Extraction steam from the turbine is supplied to the shell of each feedwater heater. The shell side is vented into the condenser. The low-pressure heaters and drain coolers are contained within the necks of each of the three sections of the Main Condenser. From the low-pressure stages the steam is exhausted into the Main Condenser where it is condensed and deaerated, and then returned to the cycle as condensate. The system ends at the Main Condenser (evaluated as a separate system for license renewal).

The Main Turbine is supported by other auxiliary systems: The turbine Steam Seal System provides sealing steam to the high-pressure and low-pressure turbines to prevent steam leakage to the atmosphere or air in-leakage to the condenser. The MHC System provides hydraulic fluid and mechanical linkage to control certain valves and the reactor pressure through pressure regulators. The Turbine Lubrication Oil System provides clean, purified oil to the turbine bearings to minimize friction. A loss of Turbine Lubrication Oil causes a turbine trip due to low pressure at the thrust bearing wear detector. The Lubrication Oil Purification and Transfer System provides make-up capability to the Turbine Lubrication Oil System. The Exhaust Hood Spray System provides cooling water to the turbine exhaust hood for blade cooling. The Turning Gear and Lift Pump System is a motor operated turning gear for both remote manual start and automatic operation. The Turbine Extraction System refers to any steam removed from the turbine during its flow through the high and low-pressure sections. The steam is supplied to the three parallel strings of three feedwater heaters. The system also includes the vent lines from flash tanks and discharge in parallel to the high-pressure heaters. The steam returns and flows into the Main Condenser.

For more detailed information, see UFSAR Section 7.7.1.5, 10.2, 10.4 and 15.2.

<u>System Boundary</u>

The license renewal scoping boundary of the Main Turbine and Auxiliary Systems encompasses that portion of the system that is located in proximity to equipment performing a safety-related function. This includes the portions of the system located within the Turbine

Building and Office Building. Included in this boundary are pressure retaining components relied upon to preserve the leakage boundary intended function of this system. For more information, refer to the License Renewal Boundary Drawing for identification of this boundary, shown in red.

Components that are not required to support the system's leakage boundary intended function are not included in the scoping boundary of the Main Turbine and Auxiliary Systems.

Not included in the Main Turbine and Auxiliary Systems scoping boundary are the main turbine stop valves (steam chest) and main turbine bypass valves which are included in the Main Steam System.

Not included in the Main Turbine and Auxiliary Systems scoping boundary are the following interfacing systems, which are separately evaluated as license renewal systems:
Main Steam System
Main Generator and Auxiliary System
Main Condenser
Condensate System
Feedwater System

Reason for Scope Determination

The Main Turbine and Auxiliary Systems is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The Main Turbine and Auxiliary Systems is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. The MTAS has potential for spatial interaction with safety related equipment within Turbine Building and Office Building. 10 CFR 54.4(a)(2)

UFSAR References

3.5
7.7.1.5
10.1
10.2
10.3
10.4
15.1
15.2

License Renewal Boundary Drawings

LR-BR-2002 Sheet 2
LR-BR-2002 Sheet 3
LR-BR-2002 Sheet 4
LR-BR-2007 Sheet 1
LR-BR-2007 Sheet 2
LR-BR-2007 Sheet 3
LR-BR-2007 Sheet 4
LR-BR-2014
LR-SN-13432.19-1
LR-GE-713E802

Table 2.3.4.7 Main Turbine and Auxiliary System
Components Subject to Aging Management Review

Component Type	Intended Functions
Accumulator	Leakage Boundary
Closure bolting	Mechanical Closure
Coolers	Leakage Boundary
Expansion Joint	Leakage Boundary
Filter Housing	Leakage Boundary
Flexible Hose	Leakage Boundary
Flow Element	Leakage Boundary
Heat Exchangers	Leakage Boundary
Piping and fittings	Leakage Boundary
Pump Casing	Leakage Boundary
Restricting Orifice	Leakage Boundary
Sight Glasses	Leakage Boundary
Steam Trap	Leakage Boundary
Strainer Body	Leakage Boundary
Tanks	Leakage Boundary
Thermowell	Leakage Boundary
Turbine Casing	Leakage Boundary
Valve Body	Leakage Boundary

The aging management review results for these components are provided in
Table 3.4.2.1.7 Main Turbine and Auxiliary System
-Summary of Aging Management Evaluation

2.4 SCOPING AND SCREENING RESULTS: STRUCTURES

The following structural components are addressed in this section:

- Primary Containment (Section 2.4.1)
- Reactor Building (Section 2.4.2)
- Chlorination Facility (Section 2.4.3)
- Condensate Transfer Building (Section 2.4.4)
- Dilution Structure (Section 2.4.5)
- Emergency Diesel Generator Building (Section 2.4.6)
- Exhaust Tunnel (Section 2.4.7)
- Fire Pond Dam (Section 2.4.8)
- Fire Pumphouses (Section 2.4.9)
- Heating Boiler House (Section 2.4.10)
- Intake Structure and Canal (Ultimate Heat Sink) (Section 2.4.11)
- Miscellaneous Yard Structures (Section 2.4.12)
- New Radwaste Building (Section 2.4.13)
- Office Building (Section 2.4.14)
- Oyster Creek Substation (Section 2.4.15)
- Turbine Building (Section 2.4.16)
- Ventilation Stack (Section 2.4.17)
- Component Supports Commodity Group (Section 2.4.18)
- Piping and Component Insulation Commodity Group (Section 2.4.19)

2.4.1 Primary Containment

System Purpose

The Primary Containment Structure is comprised of the primary containment, containment penetrations, and internal structures. The structure is enclosed by the Reactor Building, which provides secondary containment, structural support, shielding, shelter, and protection, to the containment and components housed within, against external design basis events.

The primary containment is a General Electric Mark I design and consists of a drywell, a pressure suppression chamber, and a vent system connecting the drywell and the suppression chamber. It is designed, fabricated, inspected, and tested in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section VIII, and Nuclear Code Cases1270N-5, 1271N and 1272N-5. The containment is safety related, classified Seismic Class 1 structure.

The drywell is a steel pressure vessel, in the shape of an inverted light bulb, with a spherical lower section and a cylindrical upper section. The lower spherical section is embedded externally in the reinforced concrete foundation and covered internally by a fill slab at the bottom of the drywell. The top portion of the drywell vessel consists of a steel head that is removed during refueling operations. The head is bolted to the drywell flange and is sealed with a double seal arrangement. Access into the drywell is through a personnel airlock/equipment hatch, with two mechanically interlocked doors, and other access hatches. The drywell houses the reactor pressure vessel, the reactor coolant recirculation system, safety relief valves, electromatic relief valves (EMRVs), branch connections of the reactor primary system, containment drywell spray header, and internal structures discussed below. The drywell shell and the enclosing reactor building concrete are separated by an air gap to allow for differential thermal expansion between the shell and the concrete during any mode of plant operation.

The pressure suppression chamber is a toroidal shaped, steel pressure vessel encircling the base of drywell. The suppression chamber, commonly called the torus, is partially filled with demineralized water and includes internal steel framing, and access hatches. The suppression chamber is mounted on support structures that transmit loads to the reactor building foundation. Major components inside the suppression chamber include Emergency Core Cooling Systems (ECCS) suction strainers, which are connected to the ECCS suction header located outside the chamber, torus spray header, and Y-Quenchers.

The vent system consists of ten circular vent lines, which form a connection between the drywell and the pressure suppression chamber. The lines enter the suppression chamber through penetrations provided with expansion bellows and join into a common header contained within the air space of the suppression chamber. The header discharge is through 120 downcomer pipes, which terminate below the water level in the torus. The header and the downcomer pipes are supported from the suppression chamber shell.

The primary containment is provided with a vacuum breaker system to equalize the pressure between the drywell and the suppression chamber, and between the suppression chamber and the reactor building. The vacuum breaker system assures that the external design pressure limits of the two chambers are not exceeded.

The primary containment is penetrated at several locations by piping, instrument lines, ventilation ducts, and electric leads. The penetrations consist of sleeves welded to drywell vessel or suppression chamber and are of two general types. Those required to accommodate thermal movements; and those, which experience relatively little thermal stress. Penetrations required to accommodate thermal movements are provided with expansion bellows.

Internal structures consist of a fill slab, reactor pedestal, biological shield wall and its lateral support, and structural steel. The fill slab is reinforced concrete placed in the bottom of the drywell to provide a working base for supporting the reactor pedestal and other structures and components inside the drywell.

The reactor pedestal is a reinforced concrete cylinder with an outside diameter of 26 feet. The pedestal provides structural support to the reactor pressure vessel, the biological shield wall, and floor framing. The biological shield wall extends above the reactor pedestal and is a composite steel, concrete cylinder with an inside diameter of approximately 21 feet. The wall is framed with steel columns covered with steel plate on each face and filled partly with normal density concrete and partly with high-density concrete. The top of the wall is capped with a steel plate and laterally braced to the drywell vessel.

Structural steel includes floor framing steel for the platforms inside the drywell, and a catwalk inside the suppression chamber. It also includes miscellaneous steel inside the containment such as grating, ladders, connection plates; electrical cable trays, and electrical conduits.

The purpose of the primary containment is to accommodate, with a minimum of leakage, the pressures and temperatures resulting from the break of any enclosed process pipe; and thereby, to limit the release of radioactive fission products to values, which will insure offsite dose rates well below 10CFR100 guideline limits. It also provides a source of water for ECCS and for pressure suppression in the event of a loss-of-coolant accident. The primary containment and internal structures also provide structural support to the reactor pressure vessel, the reactor coolant systems, and other safety and nonsafety related systems, structures, and components housed within. The biological shield wall provides the added function of radiation shielding to maintain drywell environment within equipment qualification parameters.

Included in the evaluation boundary of the Primary Containment are the drywell, drywell head, suppression chamber, vent lines, downcomers, drywell and suppression chamber penetrations, vent line bellows, drywell penetration bellows, personnel air lock/equipment and other hatches, pressure retaining bolting, thermowells, and internal structures listed above.

Not included in the evaluation boundary of the Primary Containment are safety relief valves and EMRVs, EMRV discharge lines, Y-Quenchers, drywell and torus spray headers, vacuum breakers, ECCS suction strainers and header, downcomer bracing, suppression chamber (torus) supports, and other component supports. These components are separately evaluated with their respective license renewal systems. That is, safety relief valves, EMRVs, EMRV discharge lines, and Y-Quenchers are evaluated with Main Steam System. Drywell and torus spray headers, and ECCS suction strainers and header are evaluated with the Containment Spray System. Vacuum breakers are evaluated with the Containment Vacuum Breakers System. Downcomer bracing, suppression chamber supports, and other component supports are evaluated with the Component Supports Commodity Group.

For more detailed information, see UFSAR Sections 3.8 and 6.2

Reason for Scope Determination

The Primary Containment meets the scoping requirements of 10 CFR 54.4(a)(1) because it is a safety-related structure which is relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), ATWS (10 CFR 50.62), and Environmental Qualification (10 CFR 50.49). The Primary Containment is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with Station Blackout (10 CFR 50.63).

System Intended Functions

1. Controls the release of fission products to the secondary containment in the event of design basis loss-of-coolant accidents (LOCA) so that off site consequences are within acceptable limits. (10 CFR 54.4(a)(1))
2. Provides sufficient air and water volumes to absorb the energy released to the containment in the event of design basis event so that pressure is within acceptable limits. (10 CFR 54.4(a)(1))
3. Provides a source of water for core spray, containment spray, and condensate transfer systems. (10 CFR 54.4(a)(1))
4. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)
5. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)
6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Anticipated Transients without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)
7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

UFSAR References

3.8
6.2

License Renewal Boundary Drawings

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Table 2.4.1 **Primary Containment**
Components Subject to Aging Management Review

Component Type	Intended Functions
Access Hatch Covers	Pressure Boundary
Beam Seats	Structural Support
Biological Shield Wall - Concrete	Shielding
Biological Shield Wall - Lateral Support	Structural Support
Biological Shield Wall - Liner Plate	Structural Support
Biological Shield Wall - Structural Steel	Structural Support
Cable Tray	Structural Support
Class MC Pressure Retaining Bolting	Pressure Boundary
Concrete embedment	Structural Support
Conduits	Enclosure Protection
	Structural Support
Downcomers	Pressure Boundary
Drywell Head	Pressure Boundary
	Structural Support
Drywell Penetration Bellows	Pressure Boundary
Drywell Penetration Sleeves	Pressure Boundary
	Structural Support
Drywell Shell	Pressure Boundary
	Structural Support
Drywell Support Skirt	Structural Support
Liner (Sump)	Leakage Boundary
Locks, Hinges, and Closure Mechanisms	Pressure Boundary
	Structural Support
Miscellaneous Steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support
Panels and Enclosures	Enclosure Protection
	Structural Support
Penetration Closure Plates and Caps (spare penetrations)	Pressure Boundary
Personnel Airlock/Equipment Hatch	Pressure Boundary
Reactor Pedestal	Structural Support
Reinforced Concrete Floor Slab (fill slab)	Enclosure Protection
	Structural Support
Seals, Gaskets, and O-rings	Pressure Boundary
Shielding Blocks and Plates	Shielding
Structural Bolting	Structural Support
Structural Steel (radial beams, posts, bracing, plate, connections, etc.)	Structural Support
Suppression Chamber Penetrations	Pressure Boundary
	Structural Support
Suppression Chamber Ring Girders	Structural Support
Suppression Chamber Shell	Pressure Boundary

Suppression Chamber Shell	Structural Support
Suppression Chamber Shell Hoop Straps	Structural Support
Thermowells	Pressure Boundary
Vent Header Deflector	HELB Shielding
Vent Jet Deflectors	HELB Shielding
Vent line bellows	Pressure Boundary
Vent line, and Vent Header	Pressure Boundary

The aging management review results for these components are provided in
Table 3.5.2.1.1 Primary Containment
-Summary of Aging Management Evaluation

2.4.2 Reactor Building

System Purpose

The Reactor Building is designed to completely enclose both the reactor pressure vessel and the primary containment structure thereby providing a secondary containment. The Reactor Building, in conjunction with Standby Gas Treatment System, provides a secondary containment function to limit the release of radioactive materials ensuring that offsite dose resulting from a postulated design basis accident will remain below 10 CFR 100 guideline values. The building also houses the spent fuel pool, the steam dryer/moisture separator storage pool, the new fuel storage vault, reactor cavity, reactor auxiliary equipment, refueling equipment, and reactor servicing equipment. Systems housed in the building include the Isolation Condenser System, Standby Liquid Control System, Core Spray, Containment Spray, Control Rod Hydraulic System equipment, and components of electrical systems.

The building is designed to Seismic Class I criteria and is constructed of reinforced concrete to the refueling floor level. Above the refueling floor, the structure is steel framework with insulated, corrosion resistant metal siding . The building roof consists of built-up roofing over lightweight concrete on metal roof decking. The foundation consists of a reinforced concrete mat founded on highly compacted Cohansey sand. The mat also supports the primary containment structure and its internals, including the reactor vessel pedestal. Exterior walls of the building and some interior walls are cast-in-place concrete designed in accordance with ACI requirements. Some interior walls are constructed of masonry block, mortar and grout. The building is designed to contain positive internal pressure without loss of function.

The purpose of the Reactor Building is to provide secondary containment when the primary containment is in service and to provide primary containment during reactor refueling and maintenance operations when the primary containment system is open. The primary objective of the building is to minimize ground level release of airborne radioactive materials, and to provide for controlled, elevated release through the Ventilation Stack of the building's atmosphere under accident conditions. The building also provides structural support, shelter, and protection to systems, structures, and components housed within, during normal plant operation, and during and following postulated design basis accidents and extreme environmental conditions.

The secondary containment function of the Reactor Building is achieved through design and construction of low leakage of air through the interlock/air lock access control doors; pipe and electrical penetration seals; and the building walls, siding, and roof. Access openings to the building are provided with interlocked double doors to minimize reactor building leakage. The exception is the entrance to the trunnion room which has only a single door for entry from the turbine building. The door design has been considered within the capability of the Standby Gas Treatment System and the Reactor Building Ventilation System to maintain reactor building leakage within the designed maximum. Passage through any of the double door entrances to the Reactor Building can occur without loss of secondary containment integrity since only one door is open at a time.

During normal plant operation, pressure in the building is maintained at a slight negative pressure, by the Reactor Building Heating and Ventilation System, so that any leakage is into the building. In an emergency condition, Reactor Building Heating and Ventilation System is isolated and the Standby Gas Treatment System serves the building. All air is exhausted to the Ventilation Stack.

Components evaluated in the Reactor Building include the foundation, all structural elements of the building, the spent fuel pool, the new fuel storage vault, the steam dryer/moisture separator storage pool, refueling bellows, structural steel, metal siding, metal deck for the roof, and roofing. In addition, the evaluation boundary includes walls, slabs, platforms, missile barriers, flood barriers, penetrations seals, structural seals, doors, miscellaneous steel, and embedments. Structural commodities considered structures, such as electrical and I&C enclosures, cable trays, electrical conduits, etc., within the building are also included in the building boundary. Components and commodities in the evaluation boundary of the building are in the scope of license renewal and subject to aging management review; except for the refueling bellows. The refueling bellows are classified non-safety related and perform their design function only when the plant is shutdown for refueling. The refuelings bellows are not credited in the current licensing basis (CLB) for design basis events or accidents and their failure would not impact a safety function. As a result scoping determined that the refueling bellows do not perform an intended function delineated in 10 CFR 54.4 (a).

Reactor building structural items separately evaluated with other license renewal systems include the reactor building crane and rail system (Cranes and Hoists), the refueling platform, new fuel storage racks, and spent fuel storage racks(Fuel Storage and Handling System), Fire barriers (Fire Protection System), and component supports (Component Supports Commodity Group).

For more detailed information see UFSAR Sections 1.2.2, 3.8.4, 6.2.3

Reason for Scope Determination

The Reactor Building meets the scoping requirements of 10 CFR 54.4(a)(1) because it is a safety-related structure which is relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), ATWS (10 CFR 50.62), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63).

System Intended Functions

1. Controls the potential release of fission products to the external environment so that offsite consequences of design basis events are within acceptable limits. The Reactor Building provides secondary containment function when the Primary Containment System is required to be in service and provides primary containment function during refueling and maintenance operations when the Primary Containment System is open. 10 CFR 54.4(a)(1)
2. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)
3. Provides protection for safe storage of new and spent fuel. 10 CFR 54.4 (a)(1)
4. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates

compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Anticipated Transients without Scram (10 CFR 50.62). 10 CFR 54.4(a)(3)
7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
8. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.2
2.5.3
3.2
3.1.53
3.7
3.8.4.1
6.2.3

License Renewal Boundary Drawings

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Table 2.4.2 Reactor Building
Components Subject to Aging Management Review

Component Type	Intended Functions
Cable Tray	Structural Support
Concrete Embedments	Structural Support
Conduits	Enclosure Protection
	Structural Support
Curb	Direct Flow
Door	Flood Barrier
	HELB Shielding
	Leakage Boundary (Secondary Containment)
Equipment Foundation	Structural Support
Fuel Pool Gates	Water retaining boundary
Fuel Pool Liner	Water retaining boundary
Fuel Pool Skimmer Surge Tank Liner	Water retaining boundary
Hatch Plugs	Enclosure Protection
	Shielding
	Structural Support
Instrument Racks	Structural Support
Liner (Sump)	Leakage Boundary
Masonry Block Walls	Structural Support
Metal Deck (Roof)	Structural Support
Metal Siding	Enclosure Protection
	Leakage Boundary (Secondary Containment)
	Pressure Relief
Miscellaneous Steel: Catwalks, Handrails, Ladders, Platforms, Grating	Structural Support
Panels and Enclosures	Enclosure Protection
	Structural Support
Penetration Seals	Flood Barrier
	HELB Shielding
	Leakage Boundary (Secondary Containment)
Pipe Whip Restraints	Pipe Whip Restraint
Reinforced Concrete Foundation	Structural Support
Reinforced Concrete Walls (above and below grade)	Enclosure Protection
	Flood Barrier
	Missile Barrier
	Shielding

Reinforced Concrete Walls (above and below grade)	Structural Support
Reinforced Concrete: Beams, Columns	Structural Support
Reinforced Concrete: Walls, Slabs, Drywell Shield Wall	Enclosure Protection
	Flood Barrier
	HELB Shielding
	Leakage Boundary (Secondary containment)
	Missile Barrier
	Shielding
	Structural Support
Roofing	Enclosure Protection
Scuppers: Pipe Sleeve, Flashing, Bolts	Leakage Boundary
Seals	Leakage Boundary
Spray Shields	Enclosure Protection
Structural Bolts	Structural Support
Structural Steel: Beams, Columns, Girders, Plates, Bracing, Trusses	Structural Support
Tube Tray	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.2 Reactor Building
-Summary of Aging Management Evaluation

2.4.3 Chlorination Facility

System Purpose

The Chlorination Facility consists of the chlorination building, spill retention pit, foundation pad for hypochlorite storage tanks, and foundation pads required to support Chlorination System components. The building is a single story steel structure, with insulated metal siding, located west of the reactor building. The base slab is founded on reinforced concrete piers supported from the circulating water tunnel, located directly below the building. Foundations for the hypochlorite tanks and other equipment are reinforced concrete pads founded on a common slab with the building and piers supported from the circulating water tunnel. The facility is nonsafety related, Seismic Class II structure

The purpose of the chlorination facility is to provide structural support, shelter, and protection to the Chlorination System, and a 480V motor control center (MCC), which provides power to the condensate transfer pumps located in the adjacent Condensate Transfer Building. The Chlorination System does not meet the scoping criteria of 10CFR54.4 and is not in scope license renewal. The MCC is in scope of license renewal because the Condensate Transfer System is relied upon to provide makeup water to the isolation condenser system to achieve hot shutdown in the event of fire and also provide makeup water to the spent fuel pool cooling system. Thus, only those portions of the building that provide structural support to the MCC and its associated electrical cables are in scope of license renewal. The remaining parts of the building, the spill retention pit, and the equipment and tank foundations perform no intended function and are not in scope of license renewal.

Components included in the scope of license renewal include concrete and structural steel, structural bolts, metal siding, metal deck, seals, the MCC enclosure, and electrical conduits. These components provide structural support, shelter, and protection to the 480V MCC,

Not included in Chlorination Facility scoping boundary are the supports for electrical conduits and the anchors for the MCC, which are separately evaluated with the license renewal Component Supports Commodity Group.

For more detailed information see UFSAR Sections 3.8.4, and 10.4.5

Reason for Scope Determination

The Chlorination Facility meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48).

The facility does not meet 10 CFR 54.4(a)(1) because it is not a safety related structure that is relied on to remain functional during and following design basis events. It does not meet 54.4(a)(2) because failure of non-safety related portions of the structure would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Chlorination Facility is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10 CFR 50.49) , ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The structure provides structural support, shelter, and protection for components credited in plant fire safe shutdown analysis. 10 CFR 54.4(a)(3)

UFSAR References

3.8.4
10.4.5.2

License Renewal Boundary Drawings

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Table 2.4.3 Chlorination Facility
Components Subject to Aging Management Review

Component Type	Intended Functions
Conduits	Enclosure Protection
	Structural Support
Door	Enclosure Protection
Metal Deck	Enclosure Protection
Metal Siding	Enclosure Protection
Panels and enclosures	Enclosure Protection
	Structural Support
Reinforced concrete foundation	Structural Support
Seals	Enclosure Protection
Structural Bolts	Structural Support
Structural steel: Beams, Columns	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.3 Chlorination Facility
-Summary of Aging Management Evaluation

2.4.4 Condensate Transfer Building

System Purpose

The Condensate Transfer Building is a single story steel structure, with metal siding, located west of the reactor building. The base slab is founded on reinforced concrete piers supported from the circulating water tunnel, located directly below the building. A half Ton hoist is incorporated in the design of the structure to facilitate removal and maintenance of equipment. The structure is classified nonsafety related, Seismic Class II.

The purpose of the Condensate Transfer Building is to provide structural support, shelter, and protection for the condensate transfer pumps, demineralized water transfer pumps, and service water booster pump. The condensate transfer pumps are in scope of license renewal because the Condensate Transfer (CT) System is relied upon to provide makeup water to the isolation condenser system to achieve hot shutdown in the event of fire and also provide makeup water to the spent fuel pool cooling system. Demineralized water transfer pumps and components, and service water booster pump and components, within the building, are not in scope of license renewal. Thus, only those portions of the building that provide structural support to the condensate transfer pumps, components, and supporting 480V electrical system components, are in scope of license renewal. The remaining parts of the building do not perform an intended function and are not in scope of license renewal.

Included in the evaluation boundary of the Condensate Transfer Building are concrete and structural steel elements of the structure, equipment foundation, and electrical conduits. Elements of the structure that provide structural support to the condensate transfer pumps, piping, components, and electrical conduits that energize the pump motors, are in scope of license renewal. Elements of the building that do not contribute to the structural support of the condensate transfer pumps do not perform an intended function and are not in scope of license renewal.

Not included in the Condensate Transfer Building scoping boundary are component supports related to the Condensate Transfer System, conduit supports, and the half ton hoist. Supports are separately evaluated with the license renewal Component Supports Commodity Group, and the hoist is evaluated with the Cranes and Hoists license renewal system.

Reason for Scope Determination

The Condensate Transfer Building meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48).

The facility does not meet 10 CFR 54.4(a)(1) because it is not a safety related structure that is relied on to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the structure would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The structure is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for environmental qualification (10 CFR 50.49) , ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The structure provides structural support, shelter, and protection for SSCs credited in plant fire safe shutdown analysis. 10 CFR 54.4(a)(3)

UFSAR References

None

License Renewal Boundary Drawings

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Table 2.4.4 **Condensate Transfer Building**
Components Subject to Aging Management Review

Component Type	Intended Functions
Conduits	Enclosure Protection
	Structural Support
Door	Enclosure Protection
Equipment Foundation	Structural Support
Metal Deck	Enclosure Protection
Metal Siding	Enclosure Protection
Panels and Enclosures	Enclosure Protection
	Structural Support
Reinforced Concrete Foundation (includes piers)	Structural Support
Seals	Enclosure Protection
Structural Bolts	Structural Support
Structural Steel: Beams, Columns	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.4 Condensate Transfer Building
-Summary of Aging Management Evaluation

2.4.5 Dilution Structure

System Purpose

The Dilution Structure is located west of the Reactor Building, on the west bank of the intake canal. The structure is a reinforced concrete, approximate 83' long and divided into three bays, each having two trash racks and one dilution pump. The three dilution pumps discharge into a common reinforced concrete tunnel that delivers dilution water from the intake canal to the discharge canal. Sheet metal and wooden enclosures located on the top slab of the structure, at grade level, provide shelter for pump motors and other Dilution System components. Foundation for the structure consists of a reinforced concrete slab, with shear keys, founded on soil 30' below grade level. Stop logs are incorporated into the structure's design to isolate each bay from the intake canal. The structure is nonsafety related, classified seismic Class II.

The purpose of the Dilution Structure is to house the dilution system and its supporting systems. The structure provides physical support, shelter, and protection to nonsafety related components designed to divert water from the intake canal to the discharge canal for thermal dilution. Additionally, the structure in conjunction with earthen dikes forms the intake canal boundary and separates it from the discharge canal.

Included in the evaluation boundary of the Dilution Structure are structural elements of the structure, the discharge tunnel, sheet metal and wooden enclosures, component supports, equipment foundations, and miscellaneous steel within the structure. Concrete elements of the building that, are required to maintain separation between the intake canal, Ultimate Heat Sink (UHS), and the discharge canal are in scope of license renewal. These components are conservatively assumed to support UHS function, and their postulated failure may result in a breach of the UHS physical boundary. This separation is desirable during normal plant operation to prevent backflow of warm water from the discharge structure and canal into the adjacent intake structure. Other elements of the structure are not in scope of license renewal because the dilution system does not perform an intended function and thus the components do not perform or support an intended function.

Not included in the evaluation boundary of the Dilution Structure is the intake and the discharge canals dikes. The intake canal dikes are separately evaluated with Intake Structure and Canal license renewal structure and the discharge canal dikes are evaluated with the Discharge Structure and Canal license renewal structure.

For more detailed information, see UFSAR Section 10.4.5

Reason for Scope Determination

The Dilution Structure meets 10 CFR 54.4(a)(2) because failure of the nonsafety related structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1).

The Dilution Structure does not meet 10 CFR 54.4(a)(1) because it is not a safety related structure that is relied on to remain functional during and following design basis events. It also does not meet 10 CFR 54.4(a)(3) because it is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provides source of cooling water for plant safe shutdown 10 CFR 54.4(a)(1)
2. Provides Ultimate Heat Sink (UHS) during design basis events 10 CFR 54.4(a)(1)
3. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)

UFSAR References

10.4.5

License Renewal Boundary Drawings

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Table 2.4.5 Dilution Structure
Components Subject to Aging Management Review

Component Type	Intended Functions
Reinforced concrete foundation	Structural Support
Reinforced concrete Walls	Water retaining boundary

The aging management review results for these components are provided in
Table 3.5.2.1.5 Dilution Structure
-Summary of Aging Management Evaluation

2.4.6 Emergency Diesel Generator Building

System Purpose

The Emergency Diesel Generator Building is a single story structure located southwest of the Reactor Building. The reinforced concrete structure consists of two compartments, one for each Emergency Diesel Generator (EDG), and an appendage vault to the building containing the diesel oil storage tank. Personnel entrances to the building are provided with reinforced concrete labyrinth walls for missile protection and a 6-inch high curb for flood protection. The building foundation is reinforced concrete slab on grade. The building is classified safety related, designed to Seismic Class I criteria.

The entrance to the tank compartment is raised above grade level, providing a 7'- 2" deep reservoir. An 18" reinforced concrete wall is provided between the oil tank area and the adjacent diesel generator compartment. The roof of the building compartments is provided with removable precast concrete sections, which are surfaced with paving material for weather protection. A 6'-6"diameter opening is provided in the roof of each diesel generator compartment for an exhaust stack. The building air intake and exhaust are through two openings on the roof of each compartment. The openings are covered with heavy grating.

The purpose of the Emergency Diesel Generator Building is to provide support, shelter, and protection for each EDG, the diesel oil storage tank, and components of fuel transfer system. Each EDG is also housed in a metal enclosure, which provides protection against rain, snow, and dust, that may enter the building through the air intake and exhaust openings on the roof. The building also houses and provides support to nonsafety related components such as grating, lighting conduit, and electrical enclosures.

Components evaluated in the Emergency Diesel Generator Building boundary include reinforced concrete and steel elements of the building, missile protection labyrinth walls, and the flood protection curbs. In addition, the evaluation boundary includes penetration seals, embedments, grating, the metal enclosure for each EDG, electrical I&C enclosures, and electrical conduits.

Not included in the Emergency Diesel Generator Building license renewal boundary are equipment supports, pipe supports, supports for electrical and I&C enclosures, EDG supports, conduit supports, and the diesel oil storage tank. The supports are separately evaluated with the Component Supports license renewal system. The diesel oil storage tank is separately evaluated with the Main Fuel Oil Storage & Transfer System license renewal system.

For more detailed information see UFSAR Sections 1.2.2 and 3.8.4.1.5

Reason for Scope Determination

The Emergency Diesel Generator Building meets the scoping requirements of 10 CFR 54.4(a)(1) because it is a safety-related structure, which is relied upon to remain functional during, and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR

50.48), and station blackout (10 CFR 50.63). The Emergency Diesel Generator Building is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62), or environmental qualification (10 CFR 50.49).

System Intended Functions

1. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)
2. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

UFSAR References

1.2.2
3.8.4.1.5
8.3.1

License Renewal Boundary Drawings

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Table 2.4.6 Emergency Diesel Generator Building
Components Subject to Aging Management Review

Component Type	Intended Functions
Concrete embedments	Structural Support
Conduits	Enclosure Protection
	Structural Support
Curb	Direct Flow
Emergency Diesel Generator Enclosure	Enclosure Protection
Miscellaneous steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support
Panels and enclosures	Enclosure Protection
	Structural Support
Reinforced concrete foundation	Structural Support
Reinforced concrete Walls, Slabs (Includes Removable Roof Slab)	Enclosure Protection
	Flood Barrier
	Missile Barrier
	Structural Support
Structural Bolts	Structural Support
Structural Steel (Plate)	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.6 Emergency Diesel Generator Building
-Summary of Aging Management Evaluation

2.4.7 Exhaust Tunnel

System Purpose

The Exhaust Tunnel consists of an underground reinforced concrete box that connects the Ventilation Stack, the Reactor Building, Turbine Building, and the Old Radwaste Building. The tunnel houses major components of the Standby Gas Treatment System (SGTS), with the exception of the exhaust fans and outlet valves. The tunnel is also used to route Reactor Building Ventilation, Turbine Building Ventilation, and Old Radwaste Building Ventilation exhaust ductwork to the Ventilation Stack, as well as process piping, and drain lines routed between the buildings. Also routed through the tunnel are 4160V AC system cables which feed core spray pumps, and 480V AC system power to the SGTS components. In addition, the tunnel contains heating steam piping routed from Heating Boiler House to the buildings. The Exhaust Tunnel is classified nonsafety related, Seismic Class II structure.

The purpose of the Exhaust Tunnel is to provide structural support, shelter, and protection to the SGTS components and ductwork, and to 4160V AC and 480V AC electrical cables. It also provides structural support, shelter, and protection for nonsafety related systems piping and ductwork routed within the tunnel.

Included in the evaluation boundary of the Exhaust Tunnel are reinforced concrete elements of the tunnel, door at the entrance to the tunnel, hatch covers, and electrical conduits. The tunnel which connects the Reactor Building and the Turbine Building to the Ventilation Stack is in scope of license renewal since it houses safety related SGTS components, and safety related electrical cables. The tunnel which connects the Ventilation Stack to the Old Radwaste Building does not contain any safety related components, or components relied upon to perform a function that demonstrates compliance with commission’s regulations for Fire Protection, Environmental Qualification, ATWS, or Station Blackout. This section of the tunnel is not in scope of license renewal. The door, hatch covers, and electrical conduits are in scope of license renewal.

Not included in the evaluation boundary of the Exhaust Tunnel are component supports, which are separately evaluated with Component Supports Commodity Group license renewal structure.

For more detailed information, see UFSAR Section 6.5.

Reason for Scope Determination

The Exhaust Tunnel meets 10 CFR 54.4(a)(2) because failure of the non-safety related structure could prevent satisfactory accomplishment of functions(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48), and Environmental Qualification (10 CFR 50.49).

The Exhaust Tunnel does not meet 10 CFR 54.4(a)(1) because it is not a safety related structure that is relied on to remain functional during and following design basis events. The tunnel is also not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)
2. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4 (a)(1). 10 CFR 54.4(a)(2)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

UFSAR References

1.2
3.8
6.5.1.2

License Renewal Boundary Drawings

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Table 2.4.7 **Exhaust Tunnel**
Components Subject to Aging Management Review

Component Type	Intended Functions
Concrete embedments	Structural Support
Conduits	Enclosure Protection
	Structural Support
Curb	Direct Flow
Door	Enclosure Protection
Hatch Cover	Enclosure Protection
Masonry block walls	Enclosure Protection
Panels and enclosures	Enclosure Protection
	Structural Support
Penetration seals	Leakage Boundary
Reinforced concrete Slabs, Walls	Enclosure Protection
	Structural Support
Seals (Gap)	Leakage Boundary

The aging management review results for these components are provided in
Table 3.5.2.1.7 Exhaust Tunnel
-Summary of Aging Management Evaluation

2.4.8 Fire Pond Dam

System Purpose

The Fire Pond Dam is constructed across Oyster Creek stream outside the protected area and approximately ¼ mile from the Reactor Building. The dam is 130 feet long and consists of two parallel lines of tongue and grooved wood sheeting, 5 feet apart and driven into Oyster Creek channel bottom. The area between the upstream and downstream sheeting is lined with a four inch reinforced concrete slab which forms a shallow open channel that directs water flow to a 45 foot wide stream spillway. Rip-rap is placed downstream of the spillway to protect the stream from erosion. The pond formed by the dam covers over 6 acres of land and has a volume equivalent to 7.2 million gallons of water. The dam is classified "Safety Class III" and subject to State of New Jersey Department of Environmental Protection and Energy dam safety regulations.

The purpose of the Fire Pond Dam is to contain fresh water for use in the fire protection system. Water from the pond is supplied to the fire protection system by two pumps housed in the fresh water pump house adjacent to the dam.

Included in the evaluation boundary of the Fire Pond Dam are structural elements of the dam, consisting of tongue and grooved treated wood sheeting, treated wood piles and walers, connection bolts, and rip-rap.

Not included in the Fire Pond Dam scoping boundary are the fresh water pumphouse and pumps. The fresh water pumphouse is separately evaluated with the Fire Pumphouses license renewal structure. The pumps are separately evaluated with the Fire Protection license renewal system.

Reason for Scope Determination

The Fire Pond Dam meets 10 CFR 54.4(a)(3) because they are relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48).

The Fire Pond Dam does not meet 10 CFR 54.4(a)(1) because it is not safety related structure that is relied on to remain functional during and following design basis events. The dam does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the dam would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The dam is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). The Fire Pond Dam retains fresh water used in the fire protection system. 10 CFR 54.4(a)(3)

UFSAR References

2.4.12
9.5.1.2

License Renewal Boundary Drawings

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Table 2.4.8 Fire Pond Dam
Components Subject to Aging Management Review

Component Type	Intended Functions
Fire Pond Dam	Water retaining boundary

The aging management review results for these components are provided in
Table 3.5.2.1.8 Fire Pond Dam
-Summary of Aging Management Evaluation

2.4.9 Fire Pumphouses

System Purpose

The Fire Pumphouses are comprised of the fresh water pumphouse and the redundant fire protection pumphouse. The fresh water pumphouse is located west of the reactor building, outside the protected area. It consists of a prefabricated sheet metal enclosure, an intake reinforced concrete structure, and foundations for two fuel oil tanks. The intake structure is divided into three separate pump intake bays, one for each of the two vertical centrifugal diesel engine driven fire pumps and one for two electric pond pumps. The inlet into the bays is protected with trash racks and stationary water screens. The two diesel driven pumps supply primary fire water, drawn from a pond formed by a small dam on the Oyster Creek, to the fire protection system. The two electric pond pumps are provided to maintain fire water system pressure. The pumps, the diesel engines, and their supporting systems are inside the enclosure, supported from the roof slab of the intake bays. The fuel oil tanks are located outside the enclosure within a diked area and are independently supported from reinforced concrete foundations. A monorail outside the enclosure, supported on structural frames, provides the means for cleaning and servicing the stationary water screens. The pumphouse and the tank foundations are classified nonsafety related, Seismic Class II.

The redundant fire protection pumphouse is located northwest of the Reactor Building, inside the protected area. It consists of a prefabricated sheet metal enclosure, foundation slab on grade, and foundation for the redundant fire protection water tank The structure houses a motor driven electric fire pump and its supporting electrical systems. This pump and its associated tank constitute an emergency supply when the primary supply is not available. The pumphouse is classified nonsafety related, Seismic Class II.

The purpose of the Fire Pumphouses is to provide structural support, shelter, and protection for Fire Protection System components, and for components which support the intended function of the system.

Included in the evaluation boundary of the Fire Pumphouses are reinforced concrete and steel elements of the pumphouses, equipment foundation, electrical conduits, electrical enclosures, component supports, tank foundations, trash racks and stationary water screens, and the monorail. Elements of the pumphouses, which provide structural support, shelter, and protection to fire protection components, including tanks are in scope of license renewal. Electrical enclosures and supports for systems and components which support the intended function of the fire protection system are also in scope of license renewal. Trash racks, stationary water screens, and supports for systems and components which do not support the intended function of the Fire Protection System are not in scope of license renewal.

Not included in the Fire Pumphouses scoping boundary are component supports, diesel engines, tanks, piping, pumps, motors and other fire protection system components, and the monorail. Component supports are separately evaluated with the Component Supports license renewal system. The diesel engines, tanks, piping, pumps, and other fire protection system components are separately evaluated with the Fire Protection license renewal system. The fresh water pumphouse monorail is separately evaluated with the Cranes and Hoists license renewal system.

Reason for Scope Determination

The Fire Pumphouses meet 10 CFR 54.4(a)(3) because they are relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48).

The pumphouses do not meet 10 CFR 54.4(a)(1) because they are not safety related structures that are relied on to remain functional during and following design basis events. The pumphouses do not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the structures would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The structures are not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

UFSAR References

9.5.1.2.3

License Renewal Boundary Drawings

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Table 2.4.9 Fire Pumphouses
Components Subject to Aging Management Review

Component Type	Intended Functions
Conduits	Enclosure Protection
	Structural Support
Metal Deck	Enclosure Protection
Metal Siding	Enclosure Protection
Panels and Enclosures	Enclosure Protection
	Structural Support
Reinforced Concrete Foundation	Structural Support
Reinforced Concrete Slab	Structural Support
Reinforced Concrete Walls	Structural Support
Seals	Enclosure Protection
Structural Bolts	Structural Support
Structural Steel	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.9 Fire Pumphouses
-Summary of Aging Management Evaluation

2.4.10 Heating Boiler House

System Purpose

The Heating Boiler House license renewal structure is comprised of the old heating boiler house and the new heating boiler house. Each heating boiler house is a single story steel structure, located southeast of the Reactor Building. The buildings are enclosed with insulated metal siding, roof metal deck, and built-up roofing. Foundations for the structures consist of reinforced concrete isolated footings and a reinforced concrete base slab on grade. The old heating boiler house is adjacent to, and provides access into the Ventilation Stack through a double door airlock. The two heating boiler houses are classified nonsafety related, Seismic Class II structures.

The purpose of the structures is to house the nonsafety related Heating & Process Steam System components and its supporting systems. Major components housed in the buildings include oil-fired boilers, heating boiler feed pumps, fuel oil pumps, Deaerator, chemical tanks and feed pumps, boiler condensate storage tank, and system piping. The old heating boiler house also houses two safety related electrical load centers, electrical panels and enclosures, a transformer, and electrical conduits required for the operation of the Standby Gas Treatment System fans. The new heating boiler house does not house any safety related systems, structures, or components.

Included in the evaluation boundary of Heating Boiler House are structural elements of the Houses. Structural elements of the old heating boiler house that provide shelter, protection, or physical support to the safety related load centers, electrical panels and enclosures, transformers, conduits, and fire protection piping, are in scope of license renewal. These elements include structural steel, reinforced concrete foundation, metal siding, metal deck, seals, doors, panels and enclosures, and conduits. Also included in the scope of license renewal are equipment foundations in the old heating boiler house, whose failure could adversely impact the intended function of the safety related components within the building. Structural elements of the new heating boiler house are not in scope of license renewal since the structure does not house safety related SSCs, or components relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification, ATWS, Fire Protection, or Station Blackout.

Not included in the Heating Boiler House scoping boundary are component supports, and airlock doors. Component supports are separately evaluated with the license renewal Component Supports Commodity Group, and the airlock doors are evaluated with the Ventilation Stack license renewal structure.

Reason for Scope Determination

The Heating Boiler House meets 10 CFR 54.4(a)(2) because failure of the non-safety related structure could prevent satisfactory accomplishment of functions(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48).

The Heating Boiler House does not meet 10 CFR 54.4(a)(1) because it is not a safety related structure that is relied on to remain functional during and following design basis events. It is also not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(2)
2. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4 (a)(1). 10 CFR 54.4(a)(2)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

UFSAR References

3.8.4

License Renewal Boundary Drawings

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Table 2.4.10 Heating Boiler House
Components Subject to Aging Management Review

Component Type	Intended Functions
Conduits	Enclosure Protection
	Structural Support
Door	Enclosure Protection
Equipment Foundation	Structural Support
Metal Deck	Enclosure Protection
	Structural Support
Metal Siding	Enclosure Protection
Panels and Enclosures	Enclosure Protection
	Structural Support
Reinforced Concrete Foundation	Structural Support
Removable Panel (in Siding)	Enclosure Protection
Seals	Enclosure Protection
Structural Bolts	Structural Support
Structural Steel: Beams, Columns, Girts, Bracing, Connection plates and angles	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.10 Heating Boiler House
-Summary of Aging Management Evaluation

2.4.11 Intake Structure and Canal (Ultimate Heat Sink)

System Purpose

The intake structure is composed of reinforced concrete slabs, beams, and shear walls. The structure is largely buried underground or submerged in seawater. Its foundation is reinforced concrete mat founded on Cohansey sand, with a concrete apron that extends into and below the intake canal. The top slab of the structure is located at grade level, open, and serves as the operating floor for the circulating water pumps, service water pumps, new radwaste service water pumps, and the emergency service water pumps.

The structure is divided into two sections, each of which contains a three segment trash rack and three traveling water screens, a chamber for two emergency service water pumps, one service water pump, one new radwaste service water pump and one high pressure screen wash pump, and a separate chamber for each of two circulating water pumps. The north side also contains two low pressure screen wash pumps. The sectional arrangement of the screens and pumps allows the use of stop logs to permit maintenance of equipment without interruption of circulating and service water flow.

The intake structure was designated seismic Class II structure in the original design. However analysis performed to support Plant Systematic Evaluation Program (SEP), Topic III 7.B, concluded that elements of the structure that are required to support Emergency Service Water pumps are capable of withstanding Seismic Class I lateral earthquake loads. Those elements were reclassified Seismic Class I, and considered safety related.

The intake canal draws seawater from Barnegat Bay and conveys it to the intake structure. The canal is 140 feet wide, dredged to 10 feet below mean sea level and separated from the discharge canal by the Dilution Pump Structure, and an earthen dike at the intake structure. The canal banks are lined with asphalt bonded stone for protection against erosion.

The canal is the Ultimate Heat Sink (UHS), required to provide cooling water for emergency shutdown, as well as during normal plant operation. It is classified nonsafety related Seismic Class II structure. However, the canal was analyzed under various conditions for conformance to Atomic Energy Commission Guide 27 (Presently Regulatory Guide 1.27). The analysis included Probable Maximum Hurricane (PMH), high water, Safe Shutdown Earthquake (SSE), and failure of bridges over the canal The results show that considering the most adverse condition, the canal provides sufficient flow for emergency shutdown of the plant and that there is an extremely low probability of losing the capability of the canal as the Ultimate Heat Sink.

The purpose of the Intake Structure and Canal is to provide seawater to dissipate waste heat from the plant during normal, shutdown and accident conditions. The intake structure also provides structural support for pumps and components which deliver seawater to the plant. In addition the structure provides structural support and access to electrical, mechanical, and structural components required to support the function and operation of Circulating Water System, Service Water System, Emergency Service Water System, Screen Wash System, and New Radwaste Service Water System, including sluice gates, stop logs, trash racks, trash cart, traveling water intake screens, platforms, ladders, and stairs.

Components evaluated in this section determined to be in the scope of license renewal include reinforced concrete beams, slabs, walls, foundation, anchorage for emergency service water and service water pumps, trash racks, the intake canal slopes, and the earthen dike.

Components evaluated in this section determined not in the scope of license renewal are the Stop logs, trash cart, platforms, ladders, and stairs. These components are provided to facilitate maintenance activities, or provide access to the equipment. They do not perform a license renewal intended function and their failure will not prevent satisfactory accomplishment of a safety related function.

Not included in the boundary of the Intake Structure and Canal are sluice gates which are included in the Circulating Water System, and Screen Wash System Components, both evaluated as separate license renewal systems. Portions of the dilution pump structure which separate the intake canal from the discharge canal are evaluated with the Dilution Pump Structure and are not evaluated in this section.

For more detailed information see UFSAR Section 1.2.2, 9.2.5, 10.4

Reason for Scope Determination

The Intake Structure and Canal meets the scoping requirements of 10 CFR 54.4(a)(1) because portions of the intake structure is safety-related and relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48). The Intake Structure and Canal is not relied upon in any analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's Regulation for environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provides source of cooling water for plant safe shutdown. 10 CFR 54.4(a)(1)
2. Provides Ultimate Heat Sink (UHS) during design basis events. 10 CFR 54.4(a)(1)
3. Provides physical support for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)
4. Provides physical support for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.2
2.4
9.2.5
10.4

License Renewal Boundary Drawings

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Table 2.4.11 Intake Structure and Canal (Ultimate Heat Sink)
Components Subject to Aging Management Review

Component Type	Intended Functions
Conduits	Enclosure Protection
Earthen water control structures (intake canal, embankments)	Water retaining boundary
Reinforced concrete foundation	Structural Support
Reinforced concrete Slab	Structural Support
Reinforced concrete Walls	Structural Support
Trash Racks	Filter

The aging management review results for these components are provided in Table 3.5.2.1.11 Intake Structure and Canal (Ultimate Heat Sink) -Summary of Aging Management Evaluation

2.4.12 Miscellaneous Yard Structures

System Purpose

Miscellaneous Yard Structures are comprised of concrete and structural steel structures located throughout the yard area. Concrete structures include foundations for outdoor tanks, standby gas treatment (SGTS) fans pad, material storage area pads, foundation for transformers, electrical substation components, transmission towers, electrical bus duct supports, trailers, and lighting poles. Concrete structures also include Service Water System (SWS) seal well, Sanitary Waste System underground concrete tank, trenches, duct banks, manholes, drainage catch basins, concrete retaining walls, concrete curbs, and concrete dikes. Structural steel structures are comprised of trailers, transmission towers, component supports located in the yard (including supports for Offsite Power System and Station Blackout (SBO) components), electrical enclosures, 480V Switchgear Room Ventilation fan platform, and yard storm drainage piping.

The SWS seal well is a reinforced concrete box structure located outside and adjacent to the reactor building east wall. The 7'-2" x 7'-2"x 6'-6" deep box is elevated 8' above ground using reinforced concrete walls that are connected to the Exhaust Tunnel Structure roof slab, which is 6'-3" underground. The well is connected by a 30" pipe to the Roof Drains and Overboard Discharge System. It is the discharge point and flow path for SWS sea water returned to the Discharge Structure and Canal through the overboard discharge line. Miscellaneous Yard Structures, including the seal well, are classified non-safety related, Seismic Class II structures.

The purpose of Miscellaneous Yard Structures is to provide structural support, shelter, and protection for safety related and non-safety related components and commodities, including offsite power, station blackout (SBO), and components credited for fire protection. The purpose of SWS seal well is to reduce the head requirements of the SWS by providing a siphon discharge and provide a flow path for the Service Water System (evaluated with Service Water System). The purpose of curbs and dikes is to contain fluid spills for controlled release. The curb at the entrance to the Emergency Diesel Generator building prevents water intrusion into the building during high flood. Trailers provide additional office space and house nonsafety related equipment and components not in scope of license renewal.

Included in the evaluation boundary of Miscellaneous Yard Structures are reinforced concrete and steel structures located in the yard area. Miscellaneous Yard Structures that perform an intended function are in the scope of license renewal. These include the SWS seal well; and the foundations for SGTS fans, condensate water storage tank, nitrogen supply tank, fire water storage tank, and carbon dioxide tank. Also included in the scope of license renewal are duct banks, manholes, trenches, and conduits containing safety related, SBO, or fire protection cables. Other yard structures in the scope of license renewal are foundations for Offsite Power System and Station Blackout System components, the curb at the entrance to the Emergency Diesel Generator building, transmission towers, startup transformers enclosures, SBO transformer enclosure, and 480V Switchgear HVAC fan platform and foundation. Miscellaneous Yard Structures, other than those described in this paragraph, perform no intended function and thus are not included in the scope of license renewal.

Not included in the evaluation boundary of Miscellaneous Yards Structure are steel and aluminum tanks, electrical components and bus ducts, foundation for emergency diesel generator fuel oil tank, foundation for diesel driven fire pump tank, and components supports. The tanks are separately evaluated with their respective license renewal mechanical system and electrical components and bus ducts are separately evaluated with electrical commodities and Offsite Power System or SBO System. Foundation for the emergency diesel generator oil tank is evaluated with the Diesel Generator Building license renewal structure and the foundation for the diesel driven fire pump oil tank is evaluated with Fire Pumphouses license renewal structure. Component supports are separately evaluated with the Component Supports Commodity Group license renewal structure.

For more detailed information refer to UFSAR Sections 1.2, 3.8, and 9.2.

Reason for Scope Determination

Miscellaneous Yard Structures meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the structures could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The structures also meet 10 CFR 54.4(a)(3) because they are relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63).

Miscellaneous Yard Structures do not meet 10 CFR 54.4(a)(1) because they are not safety related structures that are relied on to remain functional during and following design basis events. The structures are not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Environmental Qualification (10 CFR 50.49), or ATWS (10 CFR 50.62).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. Miscellaneous Yard Structures provide structural support, flood protection, shelter, and protection to safety related cables, Nitrogen Supply System components, and SGTS components. 10 CFR 54.4(a)(2)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). Miscellaneous Yard Structures provide structural support, shelter and protection to components credited for Fire Protection. The SWS seal well carries Service Water from the Reactor Building Closed Cooling Water Heat Exchangers. 10 CFR 54.4(a)(3).
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). Miscellaneous Yard Structures provide structural support, shelter and protection to components credited for SBO. 10 CFR 54.4(a)(3).

UFSAR References

1.2
3.8
9.2

License Renewal Boundary Drawings

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Table 2.4.12 **Miscellaneous Yard Structures**
Components Subject to Aging Management Review

Component Type	Intended Functions
Concrete Embedments	Structural Support
Conduits	Enclosure Protection
	Structural Support
Curb	Flood Barrier
Equipment and Component Foundations (Startup, Unit Substation, and SBO Transformers, N2 Supply, SGTS Fans and Motors, HVAC Components, etc.)	Structural Support
Miscellaneous Steel (Manhole Covers)	Enclosure Protection
Miscellaneous Steel (Platforms)	Structural Support
Panels and Enclosures (Startup, Unit Substation, and SBO Transformers)	Enclosure Protection
	Structural Support
Reinforced Concrete Trench, Manhole, Ductbank	Enclosure Protection
	Structural Support
Reinforced Concrete Walls, Slabs (SWS Seal Well)	Structural Support
	Water retaining boundary
Structural Bolts	Structural Support
Tank Foundations (CST, Fire Water, CO2, N2, Fuel Oil)	Structural Support
Transmission Towers	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.12 Miscellaneous Yard Structures
-Summary of Aging Management Evaluation

2.4.13 New Radwaste Building

System Purpose

The New Radwaste Building is a three-story structure located Northeast of the Reactor Building. The building is rectangular in plan, constructed on a reinforced concrete foundation mat at grade resting on compacted backfill. Steel framing and metal decking are provided for support of the reinforced concrete floor slabs. Walls required to contain liquid radwaste within the building, in the event of liquid radwaste system components failure, are reinforced concrete. The other walls consist of insulated metal siding or of solid concrete block construction.

The purpose of the New Radwaste Building is to house the liquid radwaste system, which is classified non-safety related and designed in accordance with the requirements of Regulatory Guide 1.26 and 1.29. The building provides structural support, shelter and protection for the system components, and radiation protection during plant operating conditions. Some elements of the building (walls and slabs) are credited, in the Current Licensing Basis (CLB), for retention of liquid radwaste during Safe Shutdown Earthquake (SSE). These elements are designed to Seismic Class I criteria and sealed watertight. The Seismic Class I boundary is based on the volume required to contain the entire liquid inventory of the radwaste system, inside the building, and taking into account the effects of non-seismic elements of the building collapsing and displacing some of this liquid. This provides assurance that postulated failures of the non-seismic liquid radwaste components within the building will not result in uncontrolled releases of radioactivity in liquid form to the environment. The rest of the building is non-seismic, conventionally designed.

Structural components of the building evaluated in this section include both Seismic Class I and non-seismic portions of the building. Components classified Seismic Class I are conservatively included in scope of license renewal since their failure could result in uncontrolled release of liquid radioactive wastes to the environment during SSE. These components consist of the foundation slab, exterior walls up to the El 48.0', and the walls and the slab above this elevation that enclose the concentrated liquid waste tanks (UFSAR Fig. 11.2-1). In addition penetration seals, which form the leak tight boundary, are also included in scope of license renewal.

Non-seismic components of the building are not in scope of license renewal. These components are not required for liquid radwaste containment and their collapse is considered in the design and will not result in release of radioactive material, in liquid form to the environment.

For more detailed information see UFSAR Sections 3.8.4 and 15.7.2

Reason for Scope Determination

The New Radwaste Building meets the scoping requirements of 10 CFR 54.4(a)(2) because failure of Seismic Class I portion of the building, during SSE, could result in release of radioactive material in liquid form to the environment.

The New Radwaste Building does not meet 10 CFR 54.4(a)(1) because it is not a safety related structure that is relied upon to remain functional during and following design basis events. It also does not meet 10 CFR 54.4(a)(3) because it is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63)

System Intended Functions

1. Prevent liquid radioactive waste from being released to the environment in the event of a Safe Shutdown Earthquake (SSE). 10 CFR 54.4(a)(2)

UFSAR References

1.2.2.1
3.8.4
11.2
11.4
15.7

License Renewal Boundary Drawings

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Table 2.4.13 New Radwaste Building
Components Subject to Aging Management Review

Component Type	Intended Functions
Penetration Seals	Water retaining boundary
Reinforced concrete foundation	Structural Support
	Water retaining boundary
Reinforced concrete Walls (above and below grade)	Water retaining boundary

The aging management review results for these components are provided in
Table 3.5.2.1.13 New Radwaste Building
-Summary of Aging Management Evaluation

2.4.14 Office Building

System Purpose

The Office Building is a three story concrete structure between the Reactor Building and the Turbine Building. The building is erected partly on the reactor building and partly on a separate mat foundation slab on grade, separated from the reactor building by 1-1/2" gap to allow for differential settlement. The reactor building west wall and the torus area roof slab form the east wall of the office building and its first floor slab, respectively .

The building can be divided into offices, laboratories, and rooms containing recirculation pump motor generator sets, 480V switchgear, 125V main station batteries, and 120V system components. The building ventilation fans are located on the office building roof slab. The switchgear rooms and the battery room are classified safety related; other areas of the building are nonsafety related. The building was designed as a seismic Class II as specified in UFSAR Section 3.8.4.

The purpose of the building is to house and support recirculation pump motor generator sets, emergency switchgear, main station batteries, and their electrical and mechanical supporting systems, including ventilation systems. The building also provides offices for site management and plant support personnel, chemistry laboratory testing equipment, showers, and locker rooms. The building also provides a secondary access to controlled areas.

Included in the evaluation boundary of the Office Building are structural elements of the building, masonry block walls, electrical cable trays, conduit, and panels and enclosures. The portion of the building that contains safety related 480V switchgear rooms, main station battery room, and those areas that provide structural support, shelter, and protection to safety related systems, structures, and components are in scope of license renewal. Safety related cable trays, conduits, and supports for safety related systems, structures, and components (SSCs) are also in the scope of license renewal. In addition, supports for nonsafety related SSCs whose failure could interact with safety related SSCs are included in the scope of license renewal.

Less critical elements of the building, such as those areas used entirely for offices, laboratory, and other facilities, are not in scope of license renewal. The areas are nonsafety related, contain no components which perform a license renewal intended function, and their failure will not impact an intended function.

Not included in the evaluation boundary of the Office Building are fire barriers, components supports, and concrete elements which are common with the reactor building. Fire barriers are evaluated separately with the Fire Protection System, Component supports are separately evaluated with license renewal Component Supports Commodity Group, and components common with the reactor building are evaluated with the Reactor Building license renewal structure.

For more detailed information, see UFSAR Sections 1.2, and 3.8

Reason for Scope Determination

The Office Building meets scoping requirements of 10 CFR 54.4(a)(1) because portion of the building is a safety related structure that is relied on to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48).

The Office Building is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)
2. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4 (a)(1). 10 CFR 54.4(a)(2)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)

UFSAR References

1.2
3.8.4

License Renewal Boundary Drawings

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Table 2.4.14 Office Building
Components Subject to Aging Management Review

Component Type	Intended Functions
Cable Tray	Structural Support
Concrete embedments	Structural Support
Conduits	Enclosure Protection
	Structural Support
Curb	Direct Flow
Masonry block walls	Structural Support
Panels and enclosures	Enclosure Protection
	Structural Support
Reinforced concrete foundation	Structural Support
Reinforced concrete Walls, Slabs, Beams	Enclosure Protection
	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.14 Office Building
-Summary of Aging Management Evaluation

2.4.15 Oyster Creek Substation

System Purpose

The Oyster Creek Substation is located west of the Reactor Building adjacent to intake and discharge canals. The substation consists of a reinforced concrete slab on grade, the breaker switch control room, transmission towers and foundation for OCGS output power to the grid and for incoming offsite power system components. The breaker switch control room is a commercial grade steel enclosure with metal siding and metal deck supported on the substation concrete slab. The substation is non-safety related, seismic class II structure

The purpose of the substation is to provide structural support, shelter and protection to non-safety related electrical components and commodities.

Included in the evaluation boundary is the reinforced concrete foundation slab, equipment foundations, transmission towers, breaker switch control room, and concrete anchors. The reinforced concrete foundation slab and transmission towers, equipment foundation, and supports associated with Offsite Power System components credited for Station Blackout (SBO) are in scope of license renewal. Other components and structures in the substation do not perform an intended function and are not in the scope of license renewal.

Not included in the evaluation boundary of the Oyster Creek Substation are electrical components and commodities within the structure. These components and commodities are separately evaluated with the Offsite Power System and Electrical Commodities license renewal systems. Component supports are separately evaluated with the Component Supports Commodity Group.

For more detail information, refer to UFSAR Sections 8.1, and 8.2.

Reason for Scope Determination

The Oyster Creek Substation is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. It is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the structure will not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Oyster Creek Substation meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for SBO (10 CFR 50.63). The Station Blackout System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49). or ATWS (10 CFR 50.62).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). The substation provides structural support, shelter and protection for offsite power system components credited for SBO. 10 CFR 54.4(a)(3).

UFSAR References

8.1
8.2

License Renewal Boundary Drawings

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Table 2.4.15 Oyster Creek Substation
Components Subject to Aging Management Review

Component Type	Intended Functions
Conduits	Enclosure Protection
	Structural Support
Door	Enclosure Protection
Equipment Foundation	Structural Support
Metal Deck	Enclosure Protection
Metal Siding	Enclosure Protection
Reinforced Concrete Foundation	Structural Support
Seals	Enclosure Protection
Structural Bolts	Structural Support
Structural Steel	Structural Support
Transmission Towers	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.15 Oyster Creek Substation
-Summary of Aging Management Evaluation

2.4.16 Turbine Building

System Purpose

The Turbine Building is a reinforced concrete and steel structure located directly west of the Reactor Building adjacent to the Office Building. The building foundation is reinforced concrete mat, founded on dense Cohansey sand 31 feet below grade level. Reinforced concrete walls extend from the top of the base mat level to the turbine generator operating floor 23 feet above grade level. Steel framework and insulated metal siding and built-up roofing enclose the turbine generator operating floor.

The building contains the plant control room, two cable spreading rooms, 4160-volt switchgear room, the “C” battery room, and a mechanical equipment room (HVAC) for the control room. The control room, the two cable spreading rooms, and the mechanical equipment room are located on the northeast corner of the building. The rooms are enclosed in reinforced concrete walls and slabs to protect safety related components and control room personnel from extreme environmental conditions and design basis events. Controlled access into the control room is provided from the turbine building and from the office building. The 4160 volt switchgear rooms and the “C” battery room are located on southwest corner of the building and also enclosed in reinforced concrete walls and slabs. A cable tray bridge tunnel, located on the roof, connects the building with the reactor building and the office building. The structural steel bridge tunnel is used to route electrical cables to the control room and the cable spreading rooms.

The rest of the building encloses steam and power conversion system and Turbine Building Closed Cooling Water (TBCCW) system, reactor protection system components, turbine building ventilation, hydrogen injection system, and supporting systems. Major components within the building include turbine generators, main condensers, moisture separators, reheaters, reactor feedwater pumps, main steam control and stop valves, condensate pumps, TBCCW heat exchangers, and their associated piping. Highly radioactive components are enclosed within heavy concrete walls with labyrinth entrances for shielding purpose. Several stairways, an elevator, and platforms allow movement within the building and access to the equipment. Equipment in the building is serviced by two cranes, the turbine building overhead bridge crane, and the heater bay overhead bridge crane.

The control room, switchgear rooms, cable spreading rooms, the 125 volt “C” battery room, and the cable tray bridge tunnel are classified safety related and meet Seismic Class I requirements. The rest of the building is classified nonsafety related, Seismic Class II. Seismic Class II portions of the building have been analyzed to demonstrate that their failure will not adversely impact Seismic Class I structures.

The purpose of the building is to provide structural support, shelter, and protection for safety and nonsafety related systems, structures, and components housed within. The control room in conjunction with Control Room HVAC system provides a habitable environment for plant operators so that the plant can be safely operated or shutdown under design basis accident conditions. The cable tray bridge tunnel provides structural support, shelter, and protection to safety related electrical cables.

Included in the evaluation boundary of the Turbine Building are structural elements of the building, including safety related rooms reinforced concrete walls, beams, and slabs, building foundation, concrete and masonry block walls, structural steel for the building and for the cable tray bridge tunnel, metal siding, metal deck, structural bolts, and the building roof. The boundary also includes penetration seals, seals, equipment foundations, concrete embedments, concrete anchors, electrical cable trays and conduits, panels and enclosures, bird screens, and miscellaneous steel. Structural elements of the building essential for structural support, shelter, and protection of safety related systems, structures, and components are in scope of license renewal. Similarly, elements of the building that provide structural support for components credited for fire protection, environment qualification, and station blackout are also included in the scope of license renewal. Internal structures that do not perform or support any of these functions, such as partitions, stairs and platforms, are not in scope of license renewal unless it is determined that their failure will impact a safety related function.

Not included in the evaluation boundary of the Turbine Building are component supports, turbine building and heater bay overhead bridge cranes, fire barriers, and the building elevator. Component supports are separately evaluated with the license renewal Component Supports Commodity Group. The overhead bridge cranes are separately evaluated with Cranes and Hoists, and the building elevator is separately evaluated with Elevators and Manlifts license renewal system. Fire barriers are separately evaluated with the Fire Protection system.

For more detailed information, see UFSAR Sections 3.1.1, 3.8.4, and 6.4

Reason for Scope Determination

The Turbine Building meets the scoping requirements of 10 CFR 54.4(a)(1) because it is a safety-related structure which is relied upon to remain functional during and following design basis events. It meets 10 CFR 54.4(a)(2) because failure of nonsafety related portions of the structure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), ATWS (10 CFR 50.62), Environmental Qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provides physical support, shelter, and protection for safety related systems, structures, and components (SSCs). 10 CFR 54.4(a)(1)
2. Provide centralized area for control and monitoring of nuclear safety related equipment. 10 CFR 54.4(a)(1)
3. Provides physical support, shelter, and protection for nonsafety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). 10 CFR 54.4(a)(2)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63) 10 CFR 54.4(a)(3)
5. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Anticipated Transients without Scram (10 CFR 50.62) 10 CFR 54.4(a)(3)

6. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48) 10 CFR 54.4(a)(3)
7. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49) 10 CFR 54.4(a)(3)

UFSAR References

1.2.2.1
3.7.2
3.8.4.1
6.4

License Renewal Boundary Drawings

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Table 2.4.16 Turbine Building
Components Subject to Aging Management Review

Component Type	Intended Functions
Bird Screen	Enclosure Protection
Cable Tray	Structural Support
Concrete embedments	Structural Support
Conduits	Enclosure Protection
	Structural Support
Equipment Foundation	Structural Support
Hatch Plugs	Enclosure Protection
	Shielding
	Structural Support
Masonry block walls	Structural Support
Metal Deck	Enclosure Protection
	Structural Support
Metal Siding	Enclosure Protection
Miscellaneous steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support
Panels and enclosures	Enclosure Protection
	Structural Support
Penetration seals	HELB Shielding
Reinforced concrete foundation	Structural Support
Reinforced Concrete Walls (above and below grade)	Flood Barrier
	Missile Barrier
	Structural Support
Reinforced concrete Walls, Slabs, Beams	Flood Barrier
	HELB Shielding
	Structural Support
Roofing	Enclosure Protection
Seals	Enclosure Protection
Structural Bolts	Structural Support
Structural steel: Beams, Columns, Girders, Plate	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.16 Turbine Building
-Summary of Aging Management Evaluation

2.4.17 Ventilation Stack

System Purpose

The Ventilation Stack is a 394 foot high tapered reinforced concrete structure located southeast of the Reactor Building, and adjacent to the Standby Gas Treatment System, and the Heating Boiler House. Its base is 7' thick reinforced concrete slab, founded on very dense sand and buried 26' below grade. Internally, the structure is divided into three levels, formed by the base slab, an intermediate slab at ground level, and an upper slab, located 11'-6" above ground level . Access into the stack is provided from the old heating boiler house and from the Exhaust Tunnel. A caged ladder outside the stack provides access to a circular platform near the top of the stack and a local platform 277' above grade.

The stack is classified as a Seismic Class I structure, relied upon to elevate gaseous effluents during normal plant operation and during accident condition. It is linked to the Reactor Building, Turbine Building, Old Radwaste Building, and the New Radwaste Building, by the Exhaust Tunnel wherein piping and air ducts between the buildings and the stack are routed. The piping and air ducts exit the tunnel near the base of the stack and penetrate it from the outside approximately 24' above ground, except for the Main Condenser Air Extraction System piping which enter the stack underground, penetrate both internal slabs to discharge above the upper slab. The original design included a 30" diameter pipe within the stack. This pipe, which runs the full height of the stack, was used as the exhaust pipe for the heating boiler. Later the pipe was capped and abandoned in-place. Other items, which penetrate the stack, include the Augmented Offgas System piping, the hardened vent discharge line, and sensing and sampling lines for the Radioactive Gaseous Effluent Monitoring System (RAGEMS).

The purpose of the Ventilation Stack is to provide an elevated discharge point for gaseous effluents collected from the Standby Gas Treatment System, Reactor Building Ventilation System, Radwaste Area Heating and Ventilation System, Main Condenser Air Extraction System (includes turbine steam seals effluents), Augmented Offgas System, and Turbine Building Ventilation System. In addition, the stack in conjunction with the Hardened Vent System provides a secondary pressure vent path for primary containment in the event the torus vent path is unavailable. Effluents through the Ventilation Stack are monitored to ensure that the limits of 10CFR20, which apply to releases during normal operation, and the limits of 10CFR100 which apply to accidental releases, are not exceeded. The stack also provides structural support to the piping, tubing, and air ducts, which penetrate it, and to components inside it, including valves, absolute filter, and radiation monitors.

The Standby Gas Treatment System, the Reactor Building Ventilation System, the Radwaste Area Heating and Ventilation System, and the Hardened Vent System have been conservatively assumed to support the intended function of the stack. This is based on the rationale that a postulated failure of HVAC ducts and piping connected to the stack could adversely affect the elevated release intended function of the stack and result in an uncontrolled release of radioactive effluents to the environment. Similarly, the capped auxiliary boiler exhaust pipe, and capped penetration sleeves are considered a part of the stack and assumed to support the intended function of the stack for the same reason.

The Turbine Building Ventilation System, the Main Condenser Air Extraction System, RAGEMS, and the Augmented Offgas System interface with the stack but have been determined not to impact its intended function. The Turbine Building Ventilation System does not physically interface with the stack; instead, its flow path is through the reactor building ventilation ductwork. The Main Condenser Air Extraction System penetrates the stack underground which precludes discharge of effluents directly to the atmosphere. The Augmented Offgas System piping and RAGEMS tubing are small in diameter such that their postulated failure is judged not to impact the intended function of the stack.

Included in the evaluation boundary of the Ventilation Stack are concrete elements, capped auxiliary boiler exhaust pipe, penetration sleeves and cap plates, doors, seals, ladders, and platforms. Concrete elements, capped auxiliary boiler exhaust pipe, penetration sleeves, cap plates, and seals support the intended function of the structure and are included in scope of license renewal. The circular platform near the top of the stack is included in the scope of license renewal because its failure will impact safety related components located at the base of the stack. The door, ladders and other platforms only provide access to components inside or outside the stack. These components are not included in the scope of license renewal because they do not support the intended function of the stack and their failure will not impact a safety related function.

Not included in the Ventilation Stack evaluation boundary are hoists and the following systems or structures, which are separately evaluated as license renewal systems or structures.

Cranes and Hoists
The Exhaust Tunnel
Heating Boiler House
Reactor Building Ventilation System
Turbine Building Ventilation System
Radwaste Area Heating and Ventilation System
Augmented Offgas System
Main Condenser Air Extraction System
Standby Gas Treatment System
Hardened Vent System
Radiation Monitoring System

For more detailed information see UFSAR Sections 1.2, and 3.8.4.

Reason for Scope Determination

The Ventilation Stack meets 10 CFR 54.4(a)(1) because it is a safety related structure that is relied upon to remain functional during and following design basis events. The Ventilation Stack is in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the ventilation stack could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Ventilation Stack is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provides physical support for non safety related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of function(s) identified for 10

CFR 54.4(a)(1). 10 CFR 54.4(a)(2)
2. Provides for the discharge of treated gaseous waste to meet the requirements of 10 CFR 100. 10 CFR 54.4(a)(1)

UFSAR References

1.2.2.2
2.1
3.8.4.1.4
6.2.7
11.3

License Renewal Boundary Drawings

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Table 2.4.17 Ventilation Stack
Components Subject to Aging Management Review

Component Type	Intended Functions
Concrete embedments	Structural Support
Hatch cover	Leakage Boundary
Miscellaneous steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support
Penetration seals	Leakage Boundary
Penetration sleeve, cap plates, capped auxiliary boiler exhaust pipe	Leakage Boundary
Reinforced concrete foundation	Structural Support
Reinforced concrete Slabs	Structural Support
Reinforced concrete stack (above and below grade)	Gaseous Release Path
	Structural Support
Structural Bolts	Structural Support

The aging management review results for these components are provided in
Table 3.5.2.1.17 Ventilation Stack
-Summary of Aging Management Evaluation

2.4.18 Component Supports Commodity Group

System Purpose

The Component Support Commodity Group consists of structural elements and specialty components designed to transfer the load applied from a system, structure, or component (SSC) to the building structural element or directly to the building foundation. Supports include seismic anchors or restraints, frames, constant and variable spring hangers, rod hangers, sway struts, guides, stops, design clearances, straps, clamps, and clevis pins. Specialty components include snubbers, sliding surfaces, and vibration isolators. The commodity group is comprised of the following supports:

Supports for ASME Class 1, 2 and 3 piping and components, including reactor vessel stabilizer, reactor vessel skirt support, and Control Rod Drive (CRD) housing supports.

Supports for ASME Class MC components including suppression chamber seismic restraints, suppression chamber support saddles and columns, and vent system supports.

Supports for cable trays, conduit, HVAC ducts, tube track, and instrument tubing.

Supports for non-ASME piping and components, including emergency diesel generator supports.

Supports for racks, panels and enclosures.

Supports for spray shields, and masonry walls.

The purpose of a support is to transfer gravity, thermal, seismic, and other lateral loads imposed on or by SSC to the supporting building structural element or foundation. Sliding surfaces, when incorporated into the support design, permit release of lateral forces, but are relied upon to carry vertical load. Specialty supports such as snubbers only resist seismic forces. Vibration isolators are incorporated in the design of some vibrating equipment to minimize the impact of vibration. Other support types such as guides and position stops allow displacement in a specified direction or preclude unacceptable movements and interactions.

The Component Support Commodity Group includes supports for mechanical, electrical and instrumentation systems, components, and structures listed above that are in the scope of license renewal. The group also includes supports for SSCs, which are not in scope of license renewal, but their supports are required to restrain or prevent physical interaction with safety related SSCs (e.g. seismic II/I). The supports include support members, welded and bolted connections, Lubrite plates, vibration isolators, concrete anchors, concrete embedments, and grout.

Included in the evaluation boundary of the Component Supports Commodity Group are support members, welded and bolted connections, Lubrite plates, vibration isolators, grout for support base plates, and concrete anchors. Snubbers are also included in the evaluation boundary of this commodity group; however they are considered active components and are not subject to aging management review.

Not included in the evaluation boundary of component supports are concrete pedestals, concrete embedments, grout and anchors used for components other than supports listed herein. These commodities are evaluated separately with the license renewal structure that contains them.

Reason for Scope Determination

The Component Support Commodity Group meets the scoping requirements of 10 CFR 54.4(a)(1) because some supports are safety-related and relied upon to maintain structural integrity during, and following design basis events. The group meets 10 CFR 54.4(a)(2) because failure of nonsafety related supports could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it provides structural support to systems relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), ATWS (10 CFR 50.62), Environmental qualification (10 CFR 50.49), and Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provides structural support or restraint to SSCs in the scope of license renewal.10 CFR 54.4(a)(1), (a)(2), (a)(3)
2. Provides structural support or restraint to SSCs not in scope of license renewal to prevent interaction with safety related SSCs. 10 CFR 54.4(a)(2)

UFSAR References

None

License Renewal Boundary Drawings

None

Table 2.4.18 **Component Supports Commodity Group**
Components Subject to Aging Management Review

Component Type	Intended Functions
Building concrete at locations of expansion and grouted anchors; grouted pads for support base plates	Structural Support
Supports for ASME Class 1 Piping and Components (constant and variable load spring hangers, guides, stops, sliding surfaces, design clearances)	Structural Support
Supports for ASME Class 1 Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for ASME Class 2 and 3 Piping and Components (constant and variable load spring hangers, guides, stops, sliding surfaces, design clearances)	Structural Support
Supports for ASME Class 2 and 3 Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for ASME Class MC Components (guides, stops, sliding surfaces, design clearances)	Structural Support
Supports for ASME Class MC Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for Cable Trays (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for conduits (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for HVAC Components (vibration isolation elements)	Vibration Isolation
Supports for HVAC Components, and Other Miscellaneous Mechanical Equipment (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for HVAC ducts (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for Masonry Walls (support members, welds, bolted connections, support anchorage to building structure)	Structural Support

Supports for Non-ASME Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for Panels and Enclosures, Racks (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for Platforms, Pipe Whip Restraints, Jet Impingement and Spray Shields, and Other Miscellaneous Structures (support members, welds, bolted connections, support anchorage to building structure)	Structural Support
Supports for Tube Track and Instrument Tubing (support Members, Welds, Bolted Connections, support anchorage to building structure)	Structural Support

The aging management review results for these components are provided in Table 3.5.2.1.18 Component Supports Commodity Group -Summary of Aging Management Evaluation

2.4.19 Piping and Component Insulation Commodity Group

System Purpose

The Piping and Component Insulation Commodity Group is comprised of pre-fabricated blankets, modules, or panels engineered as integrated assemblies to fit the surface to be insulated and to fit easily against the piping and components. The insulation includes originally installed metallic and nonmetallic materials and replacement materials.

Metallic insulation consists of stainless steel mirror insulation. Nonmetallic insulation consists of calcium silicate, asbestous, and light density, semi-rigid fibrous glass, quilted between two layers of glass scrim and encapsulated in a fiberglass cloth forming a composite blanket; or of pre-molded fiberglass modules and panels encased in fiberglass jackets. Anti-sweat insulation consist of closed cell, foamed plastic type (inside primary containment drywell) and fiberglass dual temperature or glass wool blanketing (outside primary containment drywell). Metal protective jackets are made from rolled aluminum or stainless steel. The insulation is not classified a safety related commodity.

The purpose of insulation is to improve thermal efficiency, minimize heat loads on the HVAC systems, provide for personnel protection, or prevent sweating of cold piping and components. The review of current licensing basis documents did not identify any insulation that performs a license renewal intended function. Specific areas reviewed include Environmental Qualification (EQ) basis documents, and documents associated with emergency core cooling system (ECCS) components including strainers. Heat load analysis for plant areas that contain EQ components and core spray and containment spray pumps did not credit insulation to ensure operability of the components during and post LOCA. The impact of insulation, inside the drywell, on Core Spray system suction strainers was evaluated in response to NRC Bulletin 96-03 "Potential Plugging of Emergency Core Cooling Suction Strainers by debris in Boiling Water Reactors". Evaluation results are documented in the UFSAR, Table 6.3-3. The results did not credit insulation integrity to prevent clogging of the strainers. Instead it was concluded that the blowdown and transport of insulation debris to the torus is accounted for in the suction strainer design. On this basis it was determined that piping and component insulation is not required to be in scope of license renewal. However Oyster Creek recognized the importance of maintaining hot piping and component insulation integrity to protect nearby in-scope SSCs from overheating. As a result hot piping and component insulation is conservatively included in the scope of license renewal since its failure could impact a function defined for 10 CFR 54.4 (a)(1).

Included in the scoping boundary of the Piping and Component Insulation Commodity Group is insulation for all piping and components. Hot piping and component insulation located inside structures in the scope of license; excluding Miscellaneous Yard structures, is in the scope of license renewal under 10 CFR 54.4 (a)(2). Cold piping and component insulation does not perform an intended function and is not included in the scope of license renewal. Also hot piping and component insulation located inside structures that are not in scope of license renewal, or in Miscellaneous Yard structures is not in the scope of license renewal since failure of this insulation will not impact an intended safety related function.

Reason for Scope Determination

The Piping and Component Insulation Commodity Group is not in scope under 10 CFR 54.4(a)(1) because no portions of the insulation are safety related or relied on to remain functional during and following design basis events. The Piping and Component Insulation Commodity Group is in scope under 10 CFR 54.4(a)(2) because failure of the non-safety related commodity could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The insulation is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48) and Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. Hot piping and components insulation protects nearby safety related SSCs from overheating. 10 CFR 54.4(a)(2)

UFSAR References

6.2.1.1.1
Table 6.3-3

License Renewal Boundary Drawings

None

Table 2.4.19 Piping and Component Insulation Commodity Group
Components Subject to Aging Management Review

Component Type	Intended Functions
Insulation	Thermal Insulation
Insulation Jacketing	Insulation Jacket Integrity

The aging management review results for these components are provided in Table 3.5.2.1.19 Piping and Component Insulation Commodity Group -Summary of Aging Management Evaluation

2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL COMPONENTS

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

Subsection 2.1.6.1 provides the screening methodology for determining which component groups within the scope of 10 CFR 54.4 meet the requirements contained in 10 CFR 54.21(a)(1). The component groups that meet those screening requirements are identified in this section. These identified component groups consequently require an aging management review.

As described in Subsection 2.1.6.1, the screening for electrical components was performed on a commodity group basis for the in-scope electrical systems as well as the electrical component types associated with in-scope mechanical systems and civil structures listed in Table 2.2-1.

Components which support or interface with electrical components, for example, cable trays, conduits, instrument racks, panels and enclosures, are assessed as part of the Structural Component Support Commodity Group in Section 2.4.

2.5.1 ELECTRICAL SYSTEMS

This section provides a brief description of the Oyster Creek electrical systems determined to be in the scope of license renewal. Each description includes the system purpose, reason for scope determination, intended functions, UFSAR references and identification of applicable license renewal boundary drawings. The following systems are addressed in this section:

- 120/208 Volt Non-Essential Distribution System (Section 2.5.1.1)
- 120VAC Vital Power System (Section 2.5.1.2)
- 125V Station DC System (Section 2.5.1.3)
- 24/48V Instrument Power DC System (Section 2.5.1.4)
- 4160V AC System (Section 2.5.1.5)
- 480/208/120V Utility (JCP&L) Non-Vital Power (Section 2.5.1.6)
- 480V AC System (Section 2.5.1.7)
- Alternate Rod Injection System (ARI) (Section 2.5.1.8)
- Grounding and Lightning Protection System (Section 2.5.1.9)
- Intermediate Range Monitoring System (Section 2.5.1.10)
- Lighting System (Section 2.5.1.11)
- Local Power Range Monitoring System/Average Power Range Monitoring System (Section 2.5.1.12)
- Offsite Power System (Section 2.5.1.13)
- Post-Accident Monitoring System (Section 2.5.1.14)
- Radio Communications System (Section 2.5.1.15)
- Reactor Overfill Protection System (ROPS) (Section 2.5.1.16)
- Reactor Protection System (Section 2.5.1.17)
- Remote Shutdown System (Section 2.5.1.18)

- Station Blackout System (Section 2.5.1.19)

2.5.1.1 120/208 Volt Non-Essential Distribution System

System Purpose

The 120/208 Volt Non-Essential Distribution System is an electrical distribution system which receives power from 460 volt motor control centers and 460 volt distribution panels through dry type transformers. The system is designed to provide non-essential power to various non-safety related and auxiliary plant loads. The system consists of electrical equipment manufactured to industry standards. The non-safety related lighting, space heater and miscellaneous power panels have one, two and three pole breakers to supply power to various auxiliaries.

The purpose of the system is to distribute electrical power to station auxiliaries. The system accomplishes this with a number of miscellaneous panels that supply power to non-safety related loads. Some of the panels are powered from safety related sources, but they are isolated from the safety related source by isolation devices such as fuses, circuit breakers or open disconnect switches.

This system provides power to components that are relied upon to demonstrate compliance with the 10CFR50.48 (Fire Protection). Specifically, the system provides power to the 4160V Switchgear vault ventilation controls and also to local fire detection panels. The 4160V Switchgear Ventilation System is credited under 10CFR50.48 for smoke removal and 10CFR50.63 for heat removal. The 120/208 Volt Non-Essential Distribution System also provides power to a control room ventilation fan which is relied upon to perform 10CFR54.4(a)(1) functions for control room habitability.

The system is comprised of electrical panels, electrical transformers, cable and connectors, fuses, circuit breakers, and welding receptacles.

For more detailed information, see UFSAR Section 8.3.1.1.

Reason for Scope Determination

The 120/208 Volt Non-Essential Distribution System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The 120/208 Volt Non-Essential Distribution System is in scope under 10CFR54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is in scope under 10 CFR 54.4(a)(3) because it is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63). The system is not relied upon to perform a function that demonstrates compliance with the commission's regulations for environmental qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Resist non-safety related SSC failure that could prevent satisfactory accomplishment of a safety related function. This system provides electrical power to a control room ventilation fan. 10 CFR 54.4(a)(2).

2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3).
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3).

UFSAR References

8.3.1.1.3

License Renewal Boundary Drawings

LR-BR-3000

2.5.1.2 120VAC Vital Power System

System Purpose

The 120 VAC Vital Power System is a Class 1E safety-related electrical distribution system that supplies 120 VAC power to various loads essential for operation, protection and safe shutdown of the plant. The system design incorporates redundant power sources and automatic bus transfer switches so that critical loads remain energized at all times.

The 120 Volt AC Vital Distribution System receives normal and alternate power from 460 Volt Vital Motor Control Centers 1A2 and 1B2. The system supplies this power to critical 120 VAC instrumentation, controls and auxiliaries. The system includes the Reactor Protection System (RPS) Motor Generator Sets, a Rotary Inverter motor generator set, Electrical Protection Assemblies (EPAs), 120 VAC distribution panels, transformers, transfer switches, cables, and raceway systems. The Rotary Inverter MG set 440 VAC motor is backed up by a 125 VDC motor, powered from the 125 VDC Distribution Center B.

Continuous Instrument Panel CIP-3 normally receives 120/208 VAC power from Rotary Inverter and alternate power from 460 V Vital Motor Control Center 1A2 via transformer through an auto transfer switch.

Protection System Panels 1 & 2 (PSP-1 and PSP-2) normally receive 120 VAC power from RPS Motor Generator Sets 1-1 and 1-2 respectively. The alternate source of power is available from 460 V Vital Motor Control Center (VMCC) 1A2 or 1B2 to any one of the two Protection System Panels (PSP-1 and PSP-2) via manual disconnect switches through a backup transformer. Normal and alternate power to PSP-1 and PSP-2 also pass through electrical protection assemblies (EPAs), two in series for each power source. The EPAs are circuit breakers equipped with overvoltage, undervoltage and under frequency trips. The devices protect the Reactor Protection System circuitry from voltage and frequency fluctuations.

Normal and alternate power to the Vital AC Power Panel (VACP-1) and Instrument Panels #4/4A/4B/4C are supplied from 460 V VMCCs 1A2 and 1B2 via auto transfer switches and transformers. Normal and alternate power to the Vital Lighting Distribution Panel (VLDP-1) is supplied from 460 V VMCCs 1A2 and 1B2 via auto transfer switches.

Post Accident Instrument Power Panels 1 and 2 (PDP-733-057 and PDP-733-058) receive power from 460 V VMCC 1A2 and 1B2 respectively through breakers and transformers. These panels do not have alternate power sources.

Local indication is provided at the automatic transfer switches, showing the availability of normal and alternate power. An alarm will annunciate in the Control Room when any of the auto transfer switches transfer power to alternate source.

120VAC Vital Power System components are located in the Reactor Building, Turbine Building and Main Office Building.

For additional detail, see UFSAR section 8.3.1.1.

Reason for Scope Determination

The 120 VAC Vital Power System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The 120 VAC Vital Power System is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), and station blackout (10 CFR 50.63). The system is not relied upon to perform a function that demonstrates compliance with the commission's regulations for ATWS (10 CFR 50.62).

System Intended Functions

1. Provide motive power to safety related components. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

8.3.1.1.4

License Renewal Boundary Drawings

LR-BR-3000

2.5.1.3 125V Station DC System

System Purpose

The 125V Station DC System is an electrical DC power distribution system designed to provide power to safety and non-safety related loads.

There are three complete 125 VDC distribution systems that make up the 125V Station DC Power System at Oyster Creek. Two of these systems, designated as 125 VDC distribution systems A and B, are the originally installed systems. The third system, designated as 125 VDC distribution system C, was subsequently designed and installed as a modification.

The function of the Station DC Power System is to provide a continuous source of 125 VDC power. Safety loads are supplied from DC distribution systems B and C, with DC distribution system B supplying Division B safety related loads and DC distribution system C supplying Division A safety related loads. DC distribution system A is also used to supply non-safety loads.

The system accomplishes its purpose by providing three 125 VDC main station batteries, five AC powered battery chargers, three 125 VDC distribution centers, three power panels, three transfer switches and two motor control centers. The battery output circuit breakers are normally closed and one battery charger is operated in parallel with the battery to supply power to each DC distribution center (A, B, and C). During normal operation the battery chargers maintain their respective station battery in a fully charged state by keeping it on a float charge. The battery chargers supply normal system loads with the batteries acting as a standby source of DC power upon failure of the battery chargers or during high demand transients.

DC distribution center C in the Turbine Building 4160 VAC switchgear room is physically separated from DC distribution centers A and B, which are located in the Battery Room in the Main Office Building. All batteries are located in enclosed battery rooms provided with ventilation to minimize the buildup of hydrogen gas which is formed during battery charging operation, and to maintain temperatures within battery design limits.

The 125 VDC Power System is an ungrounded system. Ground detection devices are provided on the incoming battery feeders in each distribution center. Status indications and failure annunciation for each of the 125 VDC distribution systems are provided in the Control Room.

The batteries are sized to provide power to all connected loads while maintaining adequate voltage levels to all loads. The only exception are the motor-operated valves included in the GL 89-10 program which rely on the system battery chargers to provide adequate voltage for HELB isolation.

The battery chargers for DC Distribution Systems A & B are supplied with 480 VAC power from Division B MCCs 1B2 and 1B21. The battery chargers for DC Distribution Systems C are supplied with 480 VAC power from Division A MCC 1A2.

For additional information, see UFSAR Section 8.3.2.1.

Reason for Scope Determination

The 125V Station DC System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The 125V Station DC System is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), and station blackout (10 CFR 50.63). The system is not relied upon to perform a function that demonstrates compliance with the commission's regulations for ATWS (10 CFR 50.62).

System Intended Functions

1. Provide motive power to safety related components. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48) 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Environmental Qualification (10 CFR 50.49) 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Station Blackout (10 CFR 50.63) 10 CFR 54.4(a)(3)

UFSAR References

8.3.2.1

License Renewal Boundary Drawings

LR-BR-3000

2.5.1.4 24/48V Instrument Power DC System

System Purpose

A 24/48 VDC Power System is an electrical distribution system designed to supply power to the reactor nuclear instrumentation system and Radiation Monitoring system. The 24/48 VDC Power System is made up of two sub-systems with all components located in the lower cable spreading room. Each sub-system uses two 24 VDC battery/charger assemblies connected in series, with a center tap to form a three wire system of + 24 volts line-to-common or 48 volts line-to-line. The battery chargers supply normal system loads with the batteries acting as a standby source of DC power upon failure of the battery chargers or during high demand transients. Power is supplied to system loads by two power panels, one in each sub-system.

The 24 VDC chargers are used to maintain their associated batteries in a fully charged condition while supplying normal system loads. All chargers are supplied power from the 120 VAC Vital Power System.

For additional information, see UFSAR Section 8.3.2.2.

Reason for Scope Determination

The 24/48V Instrument Power DC System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The 24/48V Instrument Power DC system is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Provide motive power to safety related components. Provides 24VDC power at the appropriate voltage level for the reliable operation of the IRMs. 10 CFR 54.4(a)(1)

UFSAR References

8.3.2.2

License Renewal Boundary Drawings

LR-BR-3000

2.5.1.5 4160V AC System

System Purpose

The 4160V AC System is an electrical distribution system designed to provide continuous electrical power necessary for plant operation, startup and shutdown.

The purpose of the 4160V AC System is to distribute electrical power to the station auxiliaries, including safety related loads. The system accomplishes this electrical distribution function utilizing metal clad switchgear, control and protective relays, current transformers, potential transformers, fuses, cable and cable connections.

The 4160V switchgear is comprised of four separate bus sections or lineups of switchgear. The four bus sections are identified as Bus Sections 1A, 1B, 1C and 1D with Bus Sections 1C and 1D being the essential or emergency switchgear lineups. All are located in the 4160V Switchgear Room of the Turbine Building, which is a vital security area. Essential Bus Sections 1C and 1D are physically isolated from each other, and from Bus Sections 1A and 1B, by two hour rated firewalls.

Bus Sections 1A and 1B are independently fed from either the Auxiliary Transformer Bank No. 4 or the Startup Transformer Banks Nos. 5 and 6. During station operation, Bus Sections 1A and 1B are normally energized and receive power from the Auxiliary Transformer, which receives its power from the 24 kV output of the Turbine Generator. During shutdown, startup, or loss of Auxiliary Transformer Power, Buses 1A and 1B are energized and receive power from the Startup Transformers, which receive their power from the 34.5 kV Oyster Creek substation. The 34.5 kV substation is supplied from either the 230 kV Oyster Creek substation, or from other 34.5 kV GPUE Transmission lines.

The 4160V AC System can also be fed from the Forked River combustion turbines, which is the OCNGS alternate AC power source during a Station Blackout event. The alternate AC source utilizes an independent connection diverse from the normal connection to the regional transmission grid. The routing is through a dedicated underground ductbank to the load break switches and SBO transformer located on site, and then through a cable trench to the switchgear breaker connection to the 4160V AC Bus 1B.

Both the non-essential and essential auxiliary loads are split between two independent radial systems. The general design requirement is to supply duplicate services from different buses. Essential Bus Sections 1C and 1D supply power to both non-essential loads and loads important to plant safety and vital to safe shutdown under accident conditions. These bus loads are redundant in that in the event of failure of either Bus Section 1C or 1D the remaining loads satisfy the requirements for a safe shutdown under accident conditions.

Emergency Bus Sections 1C and 1D are energized and receive power from Bus Sections 1A and 1B during periods of normal power availability. In the event of loss of normal or startup power to the essential 4160V switchgear Bus Sections 1C and 1D, these buses will separate from the 4160V switchgear Bus Sections 1A and 1B and the Emergency Diesel Generators will automatically start, accelerate and close in to the emergency buses. Once the diesel generators restore emergency power to Bus Sections 1C and 1D, vital loads will start automatically in a timed sequence to avoid overloading the diesel generator units on high starting current.

Since Bus Sections 1C and 1D are the station's essential buses, any nonessential auxiliary loads that they supply will be separated in the event of a loss of power. The design of the essential 4160V electrical system and the starting logic of the diesel generator units is such that a single failure will not disable both essential buses. At least one diesel generator unit will be capable of supplying power to its designated essential bus considering a Loss-of-Coolant Accident (LOCA), a Loss of Offsite Power (LOOP), and a single failure.

During a Station Blackout event, the 4160V AC System is powered from the Forked River combustion turbines through the SBO transformer to the 1B bus.

The 4.16 kV switchgear is of the metal clad magneblast design with stored energy mechanism. The circuit breakers receive 125 V dc control power from the station batteries of the same division as the safety related equipment being supplied with power.

For additional information, see UFSAR Section 8.3.1.

Reason for Scope Determination

The 4160V AC System is in scope under 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The 4160V AC system is not required under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and station blackout (10 CFR 50.63). The 4160V AC system is not required to demonstrate compliance with the Commission's regulations for Environmental Qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Provide motive power to safety related components. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

UFSAR References

8.3.1

License Renewal Boundary Drawings

LR-BR-3000

2.5.1.6 480/208/120V Utility (JCP&L) Non-Vital Power

System Purpose

The 480/208/120V Utility (JCP&L) Non-Vital Power System is an electrical distribution system designed to provide non-essential electrical power necessary for balance of plant equipment located throughout the site.

The purpose of the 480/208/120V Utility (JCP&L) Non-Vital Power System is to distribute electrical power to the station auxiliaries. The system accomplishes this electrical distribution function by utilizing offsite power and onsite metal clad switchgear, control and protective relays, cable and cable connections and transformers.

The 34.5 kV Oyster Creek offsite power substation Bus B contains the Lakeside Drive and Waretown lines (Line Nos. J69361 and R144) which deliver power to the 480/208/120V Utility (JCP&L) Non-Vital Power System. The 480 Volt North Yard Outdoor 1E1 Unit Substation at Oyster Creek Nuclear Generating Station receives power from either line R144, which is the preferred line, or line J69361, the alternate source. The remaining system components are supplied through Line J69361 that provides power to the North Yard Loads.
The 480V unit substation 1E1 in turn supplies power to seven motor control centers which then provide 480V and by additional transformers the 208V and 120V loads of the system. Additionally, 480V loads directly off the unit substation supply the Torus Water Storage Tank Heaters, the North Guard House, and the New Radwaste Service Water Pumps.
The South Yard components including the Site Emergency Building are supplied thru J69360 and J67401.
Seven motor control centers are powered from the substation. The motor control centers auxiliaries are as follows:

a. Motor Control Centers 1E11 and 1E12 for Radwaste Building loads.
b. Motor Control Centers 1E13 and 1E14 for Offgas Building loads.
c. Motor Control Centers 1E15 for Boiler House loads.
d. Motor Control Centers 1E16 for New Sample Pumphouse loads.
e. Motor Control Centers 1E17 for Redundant Fire Pump House.

Each motor control center is isolable from the other motor control centers off the substation by 3 pole circuit breakers. Control power for the circuit breakers is 120V AC and is from the 3000A Bus feeder. The motor control centers then feed 480, 208 & 120V loads. Line breakers and thermal overload devices for motors and fuses isolate individual loads from the MCCs. Direct feeds off the substation are isolated by breakers and fuses with disconnect switches at the loads.

This system is in scope to support the redundant fire pump which is powered from MCC 1E17.

For additional detail, see UFSAR Section 8.2.1.2.

Reason for Scope Determination

The 480/208/120V Utility (JCP&L) Non-Vital Power System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. It is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system will not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The 4480/208/120V Utility (JCP&L) Non-Vital Power System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48). The 4480/208/120V Utility (JCP&L) Non-Vital Power System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62), environmental qualification (10 CFR 50.49), or SBO (10 CFR 50.63).

<u>System Intended Functions</u>

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). JCP&L Non-Vital Power is credited to support the redundant fire pump for safe shutdown due to fire. 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

8.2.1.2

<u>License Renewal Boundary Drawings</u>

LR-BR-3000

2.5.1.7 480V AC System

System Purpose

The 480V AC System is an electrical distribution system designed to provide continuous electrical power necessary for plant operation, startup and shutdown.

The purpose of the 480V AC System is to distribute electrical power to the station auxiliaries, including safety related loads. The system accomplishes this electrical distribution function utilizing metal clad switchgear, step-down transformers, control and protective relays, current transformers, potential transformers, molded case circuit breakers, fuses, cable and cable connections.

Unit substations are provided to step down the 4.16 kV system voltage to 480 volts to supply the 480 Volt Distribution System. All the unit substations are fed from the 4.16 kV essential switchgear Bus Sections 1C and 1D through step-down transformers, and in turn supply power to the motor control centers, distribution panels and motors throughout the station.

There are six unit substations. The unit substations are located in pairs, and provide power to station auxiliaries as follows:
a. Unit Substations 1A1 and 1B1, in the Turbine Building basement.
b. Unit Substations 1A2 and 1B2, in the 480 Volt Switchgear Room.
c. Unit Substations 1A3 and 1B3, at the Intake Structure.

Each substation comprising a pair is physically separated from the other substation in the pair either by distance or by one hour rated fire walls.

Unit Substations 1A2 and 1B2 supply power to the vital loads. The step-down transformers in the Unit Substations are three phase, liquid filled transformers. The switchgear for each substation is in self supporting metal enclosed sections with continuous main buses having drawout units, which are replaceable under live bus conditions. Control power for the circuit breakers is 125 V dc and is from the station batteries of the same division as the safety related equipment being supplied with power.

Two vital motor control centers are provided for supplying power to vital instrumentation, reactor protection panels, critical isolation valves, vital lighting circuits, and the 125 V DC main battery chargers. These vital motor control centers are identified as Vital MCC 1A2 and Vital MCC 1B2, one each for Division A and Division B safety related loads. They are located in the 480 V Switchgear Room.

For additional detail, see UFSAR section 8.3.1.

Reason for Scope Determination

The 480V AC System is in scope under 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The 480V AC system is not required under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the

Commission’s regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49) and station blackout (10 CFR 50.63). The 480V AC system is not required to demonstrate compliance with the Commission's regulations for ATWS (10 CFR 50.62).

System Intended Functions

1. Provide motive power to safety related components. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)
4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Environmental Qualification (10 CFR 50.49). 10 CFR 54.4(a)(3)

UFSAR References

8.3.1

License Renewal Boundary Drawings

LR-BR-3000

2.5.1.8 Alternate Rod Injection System (ARI)

System Purpose

The Alternate Rod Injection (ARI) System is an electrical system which provides a method diverse from the Reactor Protection System (RPS) for depressurizing the Instrument (Control) Air System scram air header in the unlikely event the RPS does not cause a reactor scram in response to an operational transient.

The ARI System is comprised of two normally-de-energized solenoid blocking valves, in series, in the supply line to the scram air header, three normally de-energized solenoid vent valves at different locations in the scram air header piping, and associated power supplies, logic and controls.

ARI is initiated automatically if either of the following conditions occur:
1. Redundant high reactor pressure signals are received from the Nuclear Boiler Instrumentation System (NBIS)
2. Redundant low reactor water level signals are received from the NBIS

During normal reactor operation, the de-energized ARI block valves do not restrict the normal makeup air flow to the Instrument (Control) Air System scram air header. During a scram initiated by the RPS, the ARI valves are not in the vent flowpath for the scram air header.

When ARI is initiated, either manually or automatically, the two solenoid blocking valves close and the three solenoid vent valves open. This depressurizes the scram air header, causing the Control Rod Drive System scram valves to open and subsequent control rod insertion.

For additional information, see UFSAR Section 3.9.4.

Reason for Scope Determination

The Alternate Rod Injection (ARI) System is in scope of license renewal under 10 CFR 54.4(a)(3) because it is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62).

The ARI System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following a design basis event. The ARI System is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system will not prevent satisfactory accomplishment of functions identified in 10 CFR 54.4(a)(1). The ARI System is not in scope under 10 CFR 54.4(a)(3) because it is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commissions regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49 or station blackout (10 CFR 50.63).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Anticipated Transients Without Scram (10 CFR 50.62). Depressurize the scram air headers under conditions indicative of an Anticipated

Transient Without Scram. 10 CFR 54.4(a)(3)

UFSAR References

3.9.4.4
7.3
15.8

License Renewal Boundary Drawings

None

2.5.1.9 Grounding and Lightning Protection System

System Purpose

The plant Grounding and Lightning Protection System is an electrical system designed to provide a low impedence path to ground for fault currents and lightning strokes.

The purpose of the system is to ensure that local potential gradients developed during system ground faults are limited to safe and tolerable levels, to provide a zero potential difference between energized electrical equipment and nearby metallic components or structures in order to eliminate the electric shock hazard to personnel working in the area, to provide a ground fault return circuit in the event of an electrical equipment insulation failure, and to provide the least impedence path for the passage of lightning stroke current between the air terminals and ground.

The Grounding and Lightning Protection System is comprised of grounding cable, ground mats/ground bars, grounding rods, air terminals, preventor heads, and associated hardware and connectors. The system provides sufficient metal distribution in the earth to permit the dissipation of direct stroke of lightning without stroke current passing through the nonconducting parts of the building.

Reason for Scope Determination

The Grounding and Lightning Protection System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. The system is not in scope under 10 CFR 54.4(a)(2) because failure of the system will not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is in scope under 10 CFR 54.4(a)(3) because it is relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48). The Grounding and Lightning Protection System is not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4 (a)(3)

UFSAR References

None

License Renewal Boundary Drawings

None

2.5.1.10 Intermediate Range Monitoring System

System Purpose

The Intermediate Range Monitor (IRM) System is an electrical instrumentation and logic system designed to provide the capability of monitoring the neutron flux and power in the reactor core, and of providing automatic core protection. The purpose of the IRM system is to measure core neutron flux within a range of approximately 0.0003% to 40% reactor power, which provides the operator with power level indication and generates rod block and scram signals. The IRM system accomplishes its purpose by utilizing a set of fission chamber detector instruments to generate current pulse signals which are then processed to indicate core power levels in the vicinity of each detector. The IRM system is in scope for license renewal, however the detector positioning portion of the system is not in scope.

The IRM system is comprised of eight fission chamber detectors, one for each of the eight IRM channels. Each detector is located in a dry tube (evaluated with the Reactor Internals system), and is positioned axially in the core by a detector drive mechanism located below the reactor vessel. The drive mechanism is actuated by a flexible shaft routed through the reactor support structure and powered by an electric motor mounted on the outside of the reactor pedestal structure. During use, the detectors are inserted into the core to an optimum elevation for proper indication of neutron flux. When not in use, the detector is withdrawn to an elevation below the core to maximize detector life. The drives are not required for the IRM system to perform its intended function, and consequently the drive assembly components are not in scope for license renewal.

The signal from each detector is processed through a preamplifier, amplifier and attenuator, inverter, mean square analog unit, and operational amplifier, which conditions the signal sufficiently to drive a recorder, meter, and the trip units. Each IRM channel has two dual channel trip units. These units are tripped by Inoperative, Downscale, Hi, or Hi-Hi conditions. Bypass switches may be positioned to bypass up to two IRM channels simultaneously. It is not possible to simultaneously bypass more than one channel in any core quadrant.

The IRM system generates annunciator alarms, rod blocks, and scram signals relative to nuclear instrumentation degraded operation, downscale, or upscale conditions.

Each IRM instrument is adjusted through 10 ranges during reactor power ascension by using the associated range switch. Use of IRM ranges provides core protection and allows for a reasonable rate of power increase by requiring that each IRM must be on scale (between downscale and high trip points) in order to obtain a control rod withdrawal permissive. If a second high level trip point (Hi-Hi) is reached, a half scram condition results. Simultaneous trips in both RPS channels will result in a full scram of the reactor.

The IRM system utilizes electrical power from the 24/48V Instrument Power DC System for the trip relays and high voltage power supplies for the IRM detectors, the 125V Station DC system for control power to the detector drives, and the 120VAC Vital Power System for power to the detector drives and recorders.

For more detailed information, see UFSAR section 7.5.1.8.

Reason for Scope Determination

The Intermediate Range Monitor System meets 10 CFR 54.4(a)(1) because it is a safety related system that is relied upon to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It does not meet the requirements of 10 CFR 54.4(a)(3) since it is not required to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

The IRM detector drive assemblies, consisting of the drive mechanisms, flexible drive shafts, and motor assemblies function only to position the detectors and are not required for the IRM system to perform its intended function. Consequently the drive assembly components are not in scope for license renewal.

System Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. 10 CFR 54.4(a)(1)

UFSAR References

7.5.1.8

License Renewal Boundary Drawings

None

2.5.1.11 Lighting System

System Purpose

The Lighting System is comprised of Normal Lighting & Convenience System (Outdoor Area Lighting, General Plant Lighting, Office Building Lighting), Emergency Lighting and Security Lighting.

The Normal Lighting & Convenience System throughout most of the plant and office areas is supplied by fluorescent lamps operating at 277 volts. Fixtures in most areas are fed partly from the "A" distribution system and partly from the "B" system. Outdoor areas are lighted by various types of fixtures mounted on structures and poles. Certain indoor areas where 277 volt power is not readily available are lighted with fluorescent or incandescent lamps operating at 120 volts. Exit lights are normally powered by 120 volt AC lines with automatic switchover to six volt lights, powered by local six volt rechargeable storage batteries.

In addition to the above, an incandescent lighting system supplied by the 125 volt dc battery system is available for lighting stairwells and halls when ac power fails. One dc lighting panel for Control Room lighting is provided. The panel is fed via an energized ac relay. Failure of relay coil voltage allows the relay to drop out and transfer feed to dc power. Battery operated emergency lanterns with extension cords are installed in corridors and other selected points.

The Emergency lighting in the control room is provided by a combination of in-plant lighting systems (AC lighting, Vital AC lighting and DC lighting) and battery units located outside the control room in adjacent fire area OB-FA-9 with remote lamps inside the control room. For a fire affecting OB-FA-9, the DC system may be rendered inoperable. Under these circumstances, the normal AC lighting system described above, backed with EDG power, is credited for illuminating the control room. Therefore the normal lighting system is within the scope of license renewal.

Emergency 8 hour battery operated lights are provided in vital plant areas (as required by Appendix R). (UFSAR 9.5.3) Outside lamps remotely connected to emergency lighting units inside adjacent buildings provide emergency lighting required for access/egress in yard area. No other outdoors lighting systems (i.e., security lighting) are relied upon for Appendix R.

The Security Lighting System was determined not to be in the scope of licensing renewal. The function of the Security Lighting System is not an intended function.

For additional detail, see USFAR section 9.5.3.

Reason for Scope Determination

The Lighting System is not in scope under 10 CFR 54.4(a)(1) because it is not relied on to remain functional during and following design basis events. The Lighting System is not required under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of 10 CFR 54(a)(1) functions. The Lighting system is in scope under 10 CFR 54.4(a)(3) because emergency lighting is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for station blackout (10 CFR 50.63). The Lighting system is also in scope under 10 CFR 54.4(a)(3) because emergency lighting and normal lighting are relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48). The Lighting System is not required to demonstrate compliance with the Commission's regulations for ATWS (10 CFR 50.62) or environmental qualification (10 CFR 50.49).

<u>System Intended Functions</u>

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). 10 CFR 54.4(a)(3)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63). 10 CFR 54.4(a)(3)

<u>UFSAR References</u>

9.5.3
8.3.1

<u>License Renewal Boundary Drawings</u>

None

2.5.1.12 Local Power Range Monitoring System/Average Power Range Monitoring System

System Purpose

The Local Power Range Monitor (LPRM) and Average Power Range Monitor (APRM) Systems are electrical instrumentation and logic systems designed to provide the capability of monitoring the neutron flux and power in the reactor core, and of providing automatic core protection. The purpose of the LPRM system is to detect local reactor power and generate signals proportional to the local neutron flux in order to drive indicating meters used for manual evaluation of core performance. The LPRM system also generates signals to annunciators which indicate high local flux or low detector reading, and generates rod withdrawal blocks. The LPRM system accomplishes its purpose by utilizing a set of fission chamber detector instruments to generate current pulse signals which are then processed to indicate core power levels in the vicinity of each detector. The purpose of the APRM system is to average the output signals from selected LPRM amplifiers, providing a continuous indication of reactor average power from a few percent to 150% rated power. The APRM system also actuates automatic protective actions when the APRM signals exceed preset values, including high power trip and rod block. The APRM system accomplishes its purpose by collecting and processing the signals from the LPRM detectors.

The LPRM system is comprised of 31 assemblies each containing four fission chamber detectors, arranged so as to form four horizontal planes throughout the core. Each of these moisture-proof, sealed assemblies is referred to as an LPRM “string.” These assemblies are located in enclosing tubes which are inserted into the core in spaces between the fuel bundles. The enclosing tubes extend through thimbles, or in-core housing guide tubes, which penetrate and are welded to the bottom of the reactor vessel. These thimbles extend down into the under-vessel access area where they terminate in flanges which mate to the flange of each incore detector assembly. Each enclosing tube contains the four fission chamber detectors and associated cables, and a calibration tube for the traversing probe (evaluated with the Traversing Incore Probe, or TIP system). The guide tubes and enclosing tubes are not included in the LPRM system boundary and are included with reactor vessel internals (evaluated with the Reactor Internals system). The LPRM system also includes the Flux Amplifier which consists of two identical dc amplifiers and two identical trip units. The trip units are tripped on signals corresponding to LPRM Upscale, or LPRM Downscale or Inoperative.

The power supply and monitor for the LPRM system supplies three regulated voltages to operate the flux amplifiers and their associated detectors. The monitoring circuit on the power supply provides the capability to monitor either the power supply or the flux amplifier outputs on the associated meter.

LPRM outputs are indicated on four control room meters associated with the detectors at a given radial core location. A light associated with each meter illuminates if the associated channel is upscale, downscale, or manually bypassed. Alarm annunciators are associated with the LPRM High, Downscale, or Inop conditions. A rod withdrawal block is generated when one of the LPRMs feeding an APRM channel indicates a downscale condition.

The APRM system is comprised of electronic equipment which averages the output signals from selected LPRM amplifiers, trip units which actuate automatic protective actions when

APRM signals exceed preset values, and signal readout equipment. This system provides continuous indication of average reactor power within the range of a few percent to 150% rated power. There are eight APRM channels – two per core quadrant. Each core quadrant is monitored by two different APRM channels, each of which is associated with a different channel of the Reactor Protection System (evaluated separately with the RPS). Each APRM channel normally averages the inputs of eight LPRM channels.

APRM high power scram and rod block set points are flow biased; that is, they vary with recirculation flow. To accomplish this, the APRM system receives recirculation flow signals to compare with APRM power level signals. Flow converters develop the flow signal outputs for use by individual APRM channels. Each flow converter module contains independent trip circuits which trip under Upscale, Inoperative, or Comparator Mismatch conditions. These conditions each generate alarms and rod withdrawal block signals provided as input to the Reactor Protection System and Reactor Manual Control System (evaluated separately with the RMCS). The Inoperative condition also generates a reactor half scram signal. Both flow converters must be tripped to produce a full scram.

Each channel of the APRM system incorporates input bypass switches, an input counting circuit, an averaging amplifier, a flow control reference card, trip units, and channel bypass switches. For various conditions of core power and flow outside predetermined limits, rod blocks, alarms, and scram signals are produced by the APRM system logic. Rod blocks are generated for IRM High with APRM Downscale in STARTUP and REFUEL modes, APRM Downscale in RUN mode, and APRM High or Inop in all modes. Reactor trip signals are generated for IRM High-High or Inop with APRM Downscale in RUN mode, and APRM High-High or Inop in all modes of operation.

Electrical power for the LPRM and APRM power supply and monitoring units is supplied from the RPS. Loss of power results in inability to monitor reactor power. The 120VAC vital power system provides power to the APRM recorder units.

For more detailed information, see UFSAR Section 7.5.1.8.

Reason for Scope Determination

The Local Power Range Monitor and Average Power Range Monitor Systems meet 10 CFR 54.4(a)(1) because they are safety related systems that are relied upon to remain functional during and following design basis events. They do not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the systems could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). They do not meet the requirements of 10 CFR 54.4(a)(3) since they are not required to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. 10 CFR 54.4(a)(1)

UFSAR References

7.5.1.8
15.4

License Renewal Boundary Drawings

None

2.5.1.13 Offsite Power System

System Purpose

Offsite Power is an electrical distribution system designed to provide connections to OCNGS from the offsite electrical transmission system. The purpose of the Offsite Power System is to connect to the output of the OCNGS generator and to provide redundant sources of power to the power plant when the main generator is off line. It accomplishes this by employing a 230 kV substation and a connected 34.5 kV substation in a switchyard adjacent to the plant. To match voltages, transformers are utilized to connect the two substations to the Oyster Creek electrical systems.

The system is comprised of the two substations, switchyard equipment and the transformers, lines and associated equipment to connect Oyster Creek with the offsite electrical distribution system. Two 230 kV lines deliver power to and from Oyster Creek 230 kV substation and a third line normally delivers backup power to Atlantic Electric but can be utilized to deliver power to OCNGS for normal plant shutdown. The 230 kV substation is connected to the Oyster Creek generator output through the two Oyster Creek main transformers. The main generator is also connected to the plant electrical system through the auxiliary transformer that supplies the station electrical power during plant operation. The 230 kV substation is also connected to the Forked River combustion turbines. These turbines also provide Blackout Power to the station directly to the 4160V bus 1B through a separate Station Blackout (SBO) transformer (evaluated with the Station Blackout and Support System). Each of the 230 kV buses also feed the 34.5 kV substation.

The 34.5 kV substation has connections to six offsite power lines, three per bus and also the feeds from the 230 kV bus. It connects to the plants electrical power system through the start-up transformers and supplies the 480/208/120V Utility (JCP&L) Non-Vital Site Power System. The two buses of the 34.5 kV substation feed the start-up transformers, which connect to 4160V AC buses 1A & 1B. In the event both 34.5 kV buses are unavailable, the startup transformers can receive power directly from the Whitings Q121 offsite power line.

The system begins at the connections of the offsite electric transmission lines to the 230 kV and 34.5 kV Oyster Creek substations. The 230 kV substation is connected to the Oyster Creek generator output through the Oyster Creek main transformers and accepts power from the Forked River combustion turbines. The generator also connects to the plant 4160V AC System through the auxiliary transformer. Each of the 230 kV buses connects with a bus of the 34.5kV substation that supplies the 480/208/120V Utility (JCP&L) Non-Vital Site Power System. The system ends at the 34.5 kV Oyster Creek substation connection from the startup transformers to the plant 4160V AC System at switchgear breakers S1A, S1B and at the dilution plant bus switchgear and at the auxiliary transformer connection to the same 4160V AC System at breakers 1A and 1B. Not included in the scoping boundary of the Offsite Power System are the S1A, S1B, 1A and 1B switchgear breakers, which are evaluated with the 4160V AC System for license renewal scoping.

Not included in the Offsite Power System are the offsite electrical distribution system and the OCNGS 4160V AC, the Station Blackout and Support and the JCP&L Non-Vital Site Power systems. These OCNGS plant systems are separately evaluated as license renewal systems.

The portion of the Offsite Power System in scope for License Renewal starts at the disconnect switches (bus side) of the switchyard circuit breakers (banks 5 and 6) connecting the 34.5 kV Oyster Creek substation to OCNGS and continues through the startup transformers to the connection to switchgear breakers S1A and S1B of the plant 4160V AC buses. Additionally, the in scope portion for License Renewal consists of the disconnect switches (bus side) of the switchyard circuit breakers for J69361 Bus and R144 Bus connecting the 34.5 kV Oyster Creek substation to the disconnect switches of transformers 732-15 and 16 that feed the 480/208/120V Utility (JCP&L) Non-Vital Site Power System. It includes circuit breakers, disconnect switches, transformers, battery power supply (substation breakers and switches), protection devices, connectors and components.

For additional detail, see UFSAR Section 8.2.

System Operation

N/A

System Boundary

N/A

Reason for Scope Determination

The Offsite Power System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. It is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system will not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Offsite Power System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and SBO (10 CFR 50.63). The Offsite Power System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for ATWS (10 CFR 50.62) or environmental qualification (10 CFR 50.49).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout 10 CFR 50.63. (Offsite power is credited for restoration of normal AC power following the SBO coping period. During the coping period Oyster Creek is supplied power by the Alternate AC source, the Forked River combustion turbines.) 10 CFR 54.4(a)(3)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection 10 CFR 50.48. (Offsite power is credited to support safe shutdown due to fire) 10 CFR 54.4(a)(3)

UFSAR References

8.2

License Renewal Boundary Drawings

LR-BR-3000

2.5.1.14 Post-Accident Monitoring System

System Purpose

Post Accident Monitoring is an electrical monitoring system whose purpose is to display and record plant parameters of Drywell radiation and pressure levels, Torus level and temperature and Safety/Relief Valve flow detection during and following a Loss Of Coolant Accident. The associated pressure retaining components are included in and evaluated by other License Renewal systems.

The system accomplishes its purpose by monitoring the drywell and suppression pool parameters and the safety relief valves position status during post accident plant conditions. This information is provided to the Control Room for indication and select parameters are recorded.

The Post Accident Monitoring System is comprised of Containment High Range Radiation Monitors, Safety Valve and Relief Valve Accident Monitoring Instrumentation, Suppression Pool Temperature and Water Level Monitoring, and Containment Pressure Indication. Redundancy is provided for all monitored parameters.

Containment High Range Radiation Monitors

Two high range radiation monitors are installed within the drywell, with readouts in the Control Room. These monitors provide the capability to monitor radiation levels in the drywell, and the signal from these monitors isolate the drywell ventilation on a high radiation reading.

Safety Valve and Relief Valve Accident Monitoring Instrumentation

The purpose of the safety/relief valve accident monitoring instrumentation is to alert the operator to a stuck open safety or relief valve. The primary detectors are acoustic monitors with thermocouples providing backup capability. Additional plant parameters including reactor pressure and suppression pool temperature provide the safety grade information to the operators so action in response to these symptoms can be taken.

Suppression Pool Temperature Monitoring

Two redundant suppression pool temperature monitoring channels are provided, each consisting of six dual element RTD temperature sensors located within thermowells. The thermowells extend in through the Torus shell (evaluated with Primary Containment). These signal loops compute bulk water temperature for display and alarm on a Main Control Room Panel.

Torus Water Level

Two wide range redundant Torus water level measuring loops are provided, each consisting of

a differential pressure transmitter, digital indicator and recorder. The transmitter sensing lines are connected to the Torus (evaluated with Containment Vacuum Breakers). The digital recorders and indicators are located in the Control Room. This instrumentation performs no automatic protective functions, but provides safety related indication for LOCA and post LOCA conditions.
Two narrow range torus water level measuring loops are provided, each consisting of a differential pressure transmitter, power supply and indicator. Additionally, a recorder in provided for one loop. The transmitters are located in the Reactor Building and the indicators and recorder are located in the Control Room.

Containment Pressure

Two redundant containment pressure measuring loops are provided, each consisting of a pressure transmitter and recorder. The transmitters are located in the Reactor Building and indication and recorders are located in the Control Room. This instrumentation performs no automatic protective functions, but provides safety related indication for LOCA and post LOCA conditions.

The Post Accident Monitoring System begins at the electrical radiation detectors, level transmitters, pressure transmitters, temperature elements and acoustic monitors and continue through the associated circuitry that provide indication of, alarms to and records accident and post accident plant parameters in the Control Room. Not included in the scoping boundary of the Post Accident Monitoring System is the pressure retaining components for monitoring Torus temperature which are evaluated with the Primary Containment structure and Torus water level which are evaluated with Containment Vacuum Breakers system for license renewal.

The Post Accident Monitoring System components for the Containment High Range Radiation Monitors, Suppression Pool Temperature and Water Level Monitoring, and Containment Pressure Indication support system intended functions and are included within the scope of license renewal. The Safety Valve and Relief Valve Accident Monitoring Instrumentation and the narrow range Torus Water Level components associated with the Post Accident Monitoring System are not required to support intended functions. This portion of the Post Accident Monitoring System is not included within the scope of license renewal.

For more detailed information, see UFSAR Section(s) 5.2.2.4.2.2, 7.6.1.4, 11.5.2.13 and 12.3.4.1.5.

Reason for Scope Determination

The Post-Accident Monitoring System is in scope under 10 CFR 54.4(a)(1) because portions of the system are safety related and relied on to remain functional during and following design basis events. The Post-Accident Monitoring System is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system will not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Equipment Qualification (10 CFR 50.49) and for Fire Protection (10 CFR 50.48). The Post-Accident Monitoring System is not relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for ATWS (10 CFR 50.62) or Station Blackout (10 CFR 50.63).

System Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. (Drywell ventilation is isolated on high radiation level. Safety grade indication of Drywell radiation and pressure, Torus level and temperature are provided.) 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Fire Protection (10 CFR 50.48). (Torus level and temperature indication are provided for Fire Safe Shutdown.) 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49). (Drywell radiation and pressure, Torus level and temperature and Safety Relief Valves Acoustic Monitoring are environmentally qualified.) 10 CFR 54.4(a)(3)

UFSAR References

1.9
5.2.2.4.2.2
7.6.1.4
11.5.2.13
12.3.4.1.5

License Renewal Boundary Drawings

None

2.5.1.15 Radio Communications System

System Purpose

The Radio Communications System is an electrical system designed to provide two-way voice communication between operations personnel operating safe shutdown equipment during a fire emergency and Station Blackout. The Radio Communications System accomplishes this by providing the operators with two-way portable radio units supported by repeaters and antennas.

The Radio Communication System is comprised of primary and installed spare base station transmitter-repeaters located in the upper cable spreading room, portable radio units with batteries and chargers stored in the control room, and antennas with associated cabling located at selected locations in the reactor building and turbine building. The individual portable radios also have a direct mode (talk-around) feature that provides direct communication between radios without utilizing repeaters. Electrical power for the primary base station transmitter and repeater is supplied from the 120VAC Vital Power System.

Reason for Scope Determination

The Radio Communications System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48) and Station Blackout (10 CFR 50.63).

The system does not meet 10 CFR 54.4(a)(1) because it is not safety related or relied on to remain functional during and following design basis events. The system does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The system is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for Environmental Qualification (10 CFR 50.49) or ATWS (10 CFR 50.62).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commissions regulations for Fire Protection (10 CFR 50.48) (10 CFR 54.4(a)(3)).
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commissions regulations for Station Blackout (10 CFR 50.63) (10 CFR 54.4(a)(3)).

UFSAR References

None

License Renewal Boundary Drawings

None

2.5.1.16 Reactor Overfill Protection System (ROPS)

System Purpose

The Reactor Overfill Protection System (ROPS) is an electrical instrumentation and logic system designed to minimize the potential for overfilling the reactor to the elevation of the main steam lines. If the water level in the reactor vessel were to exceed the height of the main steam lines, the resulting condition could result in main steam line break due to water-filled dead weight and potential seismic loads, excessive piping loads from water hammer due to rapid steam void collapse, or potential malfunction of MSIVs, safety valves, turbine stop valves, or turbine bypass valves from the effects of water or two-phase flow. The purpose of the ROPS is to provide backup automatic reactor vessel overfill protection to mitigate main feedwater overfeed events. The ROPS accomplishes this purpose by utilizing existing reactor vessel level sensors used by the Reactor Protection System (RPS evaluated with the Reactor Protection System) in a one-out-of-two-twice logic to trip all three feedwater pumps on reactor high level, provided the total feedwater flow is not below a prescribed rate and the system is not manually bypassed for testing.

The ROPS is comprised of signals from four level sensors currently used in the RPS, a signal from a total feedwater flow instrument, and electrical components and controls necessary for its operation. A normal/bypass switch is located on the control room panel, and is placed in bypass for periodic testing of the feedwater pump trip logic. The low feedwater flow interlock automatically bypasses the ROPS when its operation is unnecessary due to feedwater flow being reduced to below a prescribed rate by automatic or operator action. The one-out-of-two-twice reactor vessel level logic assures that a common mode failure of the level sensors associated with a sensing line malfunction will not spuriously initiate the ROPS. Alarms are provided in the control room for signaling ROPS A level sensors actuation, ROPS B level sensors actuation, or ROPS bypassed.

The ROPS is a regulatory-required backup protection system to the Reactor Level and Feedwater Control System (evaluated with the Feedwater System), and is totally independent from the Feedwater Control System as required by the implementing USNRC Generic Letter 89-19.

For more detailed information, see UFSAR section 7.7.1.6.

Reason for Scope Determination

The Reactor Overfill Protection System meets 10 CFR 54.4(a)(1) because it is a safety-related system that is relied upon to remain functional during and following design basis events. It does not meet 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system could not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). It does not meet the requirements of 10 CFR 54.4(a)(3) since it is not required to demonstrate compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), ATWS (10 CFR 50.62), or station blackout (10 CFR 50.63).

System Intended Functions

1. Provide motive power to safety related components. The ROPS utilizes input from RPS and

therefore has a direct interface with safety-related RPS instruments for determination of reactor level. ROPS is in scope for license renewal in that failure of ROPS components could adversely affect the safety related RPS system. 10 CFR 54.4(a)(1)

UFSAR References

7.7.1.6

License Renewal Boundary Drawings

None

2.5.1.17 Reactor Protection System

System Purpose

The Reactor Protection System is an electrical logic system designed to furnish signals to trip the reactor and to initiate certain Engineered Safety Feature (ESF) Systems. The purpose of Reactor Protection System action is to prevent fuel damage, limits steam pressure, and prevent or restrict the release of radioactive materials. The system accomplishes this purpose by sensing plant parameters and generating reactor trip, isolation and ESF actuation signals when sensed parameters exceed pre-established limits.

The RPS system protection and initiation actions include but are not limited to the following:

Reactor Trip
Rod Withdrawal Block
Core Spray Cooling Initiation
Reactor Vessel Isolation
Primary Containment Isolation
Standby Gas Treatment System Initiation
Secondary Containment Isolation
Isolation Condenser Initiation
Turbine Trip
Recirculation Pump Trip
Offgas System Isolation

The Reactor Protection System (RPS) is comprised of dual logic channels. Each channel has an independent source of ac power, fail safe design and high reliability in initiating protective actions and preventing spurious trips. Each independent logic channel has two subchannels of tripping devices, thus the system has a total of four independent subchannels. There are some exceptions to this logic scheme, such as the logic associated with the main condenser low vacuum scram. Other exceptions are described in UFSAR Section 7.2.1.1.2.

The RPS power is supplied through two independent vital buses from Protection System Panels No. 1 and 2. The normal power supply to Protection System Panel No. 1 is from 4160 volt bus 1A to 4160 volt emergency bus 1C, then through a transformer to 480 volt substation 1A2 to M-G set 1-1 which supplies 120 volt single phase power to the Protection System Panel. The normal power supply to Protection System Panel No. 2 is from 4160 volt bus 1B to 4160 volt emergency bus 1D, then through a transformer to 480 volt substation 1B2 to M-G set 1-2 which supplies 120 volt single phase power to the Protection System Panel. The motor generator set is equipped with a flywheel to provide inertial smoothing of switching transients upstream of the motor.

An alternate source of power is available to either channel of the RPS when a motor generator set is out of service. This source takes power from either vital motor control center 1A2 or 1B2 at 480 volts ac, steps the voltage down to 115 volts, and supplies power to either Protection System Panel 1 or 2 by means of selector switches in the Control Room. If normal ac power to the RPS M-G set is lost, emergency power is supplied from the Emergency Diesel Generators, which feed motor control centers 1A2 and 1B2.

The 120V AC power sources to the RPS Protection System Panels 1 and 2 are from the 120V AC Vital Power System. The 120V AC Vital Power System also includes the M-G sets. The 120V AC Vital Power System is evaluated as its own license renewal system, and the associated components are not included in the evaluation boundary of the RPS system scoping.

The 125V DC power sources to the Reactor Protection System are provided by 125V DC Battery B through 125V DC Power Panel D, and by 125V DC Battery C through 125V DC Power Panel F. The 125V Station DC System is evaluated as its own license renewal system, and the associated components are not included in the evaluation boundary of the RPS system scoping.

For additional details, see UFSAR Sections 7.2 and 7.3.

Reason for Scope Determination

The Reactor Protection system is in scope under 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The Reactor Protection system is not required under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for fire protection (10 CFR 50.48). The Reactor Protection system is not required to demonstrate compliance with the Commission's regulations for ATWS (10 CFR 50.62), environmental qualification (10 CFR 50.49) or station blackout (10 CFR 50.63).

System Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform to a function that demonstrates compliance with the Commission’s regulations for Fire Protection. 10 CFR 54.4(a)(3).

UFSAR References

7.2
7.3

License Renewal Boundary Drawings

None

2.5.1.18 Remote Shutdown System

System Purpose

The Remote Shutdown System is provided to enable the operators to achieve and maintain hot and cold shutdown if it becomes necessary to evacuate the control room. The Remote Shutdown System is comprised of a remote shutdown panel and several local shutdown panels located outside the control room.

The remote shutdown panel includes controls and indication to assure safe shutdown and cooldown of the reactor in the event of fire causing evacuation of the Control Room or loss of Control Room function due to damage in the cable spreading rooms. Isolation Condenser "B" is utilized for decay heat removal and reactor cooldown to establish a safe shutdown condition. The remote shutdown panel includes instrumentation for monitoring reactor pressure and level, and also indicating lights for monitoring the status of the local shutdown panels. The remote shutdown panel is activated through transfer switches which are keylocked and alarmed in the Control Room to prevent inadvertent actuation.

Local shutdown panels are provided for local control of other safety related equipment important for achieving and maintaining safe shutdown. There are six local shutdown panels that provide local control capability for various pumps, breakers, valves, ventilation systems, and an emergency diesel generator.

For additional details see UFSAR Section 9.5.1 and 3.1.15.

Reason for Scope Determination

The Remote Shutdown System is in scope under 10 CFR 54.4(a)(1) because it is a safety related system that is relied on to remain functional during and following design basis events. The Remote Shutdown System is not required under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system would not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54(a)(1). It also meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), Environmental Qualification (10 CFR 50.49) and Station Blackout (10 CFR 50.63). The Remote Shutdown System is not required to demonstrate compliance with the Commission's regulations for ATWS (10 CFR 50.62).

System Intended Functions

1. Sense process conditions and generate signals for reactor trip or engineered safety features actuation. The Remote Shutdown System allows operators to monitor critical plant parameters and achieve and maintain safe shutdown from outside the control room. 10 CFR 54.4(a)(1)
2. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commissions regulations for Fire Protection (10 CFR 50.48). The Remote Shutdown System allows for safe shutdown from outside the control room by transferring control to local shutdown panels and monitoring local shutdown panel status. 10 CFR 54.4(a)(3)
3. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Environmental Qualification (10 CFR 50.49)

10 CFR 54.4(a)(3)

4. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission's regulations for Station Blackout (10 CFR 50.63) 10 CFR 54.4(a)(3)

UFSAR References

9.5.1
3.1.15

License Renewal Boundary Drawings

None

2.5.1.19 Station Blackout System

System Purpose

The Station Blackout (SBO) System at Oyster Creek is an electrical supply system that provides Alternate AC (AAC) power to Oyster Creek Nuclear Generating Station (OCNGS) for the regulated event of loss of all AC power (10 CFR 50.63 - Station Blackout). The source of electrical power to the SBO system is the Forked River Combustion Turbines power plant, an electrical power plant that is owned, operated and maintained by FirstEnergy and designed for peak loading to the grid. The Forked River Combustion Turbines (FRCTs) are made available by FirstEnergy to provide power during a station blackout event, in accordance with an Interconnection Agreement and supplemental Station Blackout Agreement with AmerGen. The Oyster Creek commitments for compliance with the station blackout rule, including the FRCT Alternate AC power source, was reviewed and approved by the NRC in their Safety Evaluation enclosed with NRC letter dated August 13, 1991, and Supplemental Safety Evaluation enclosed with NRC letter dated February 12, 1992.

The purpose of the Station Blackout System is to independently provide sufficient power to energize all equipment required to achieve and maintain the plant in a safe shutdown condition following a station blackout event. The FRCTs, which are located adjacent to the Oyster Creek switchyard, are designed to be available within one hour of the onset of a station blackout event, and provide adequate Alternate AC power for the duration of the event. Recovery from the station blackout event is complete upon restoration of normal offsite AC power from the Offsite Power System.

System Operation

The SBO System is comprised of the Forked River Combustion Turbines power plant and associated electrical connection to OCNGS. The connection between OCNGS and the FRCTs utilizes an independent connection diverse from the normal connection to the regional transmission grid. The routing is through a dedicated underground ductbank to the load break switches and SBO transformer located on site, and then through a cable trench to the switchgear breaker connection to the 4160V AC Bus 1B. In the event of a Station Blackout at OCNGS, one of the combustion turbines is disconnected from the regional transmission system, connected to the OCNGS SBO transformer by closure of appropriate load break switches and breakers, started and operated to provide AC power to OCNGS to cope with the station blackout. The SBO transformer, control panel, load break switches and the switchgear circuit breakers are dependant upon the 125V Station DC System.

System Boundary

The Station Blackout System boundary begins at the Forked River Combustion Turbines power plant, and continues through the output breakers, through the underground duct bank to the load break switches, the SBO transformer, and ends at the switchgear circuit breaker that connects to the OCNGS 4160V AC System. It includes the Forked River Combustion Turbines power plant, circuit breakers, load break switches, transformers, relays, control switches, cables, conduits, connectors and miscellaneous components.

Not included within the scope of the Station Blackout System are the 4160V AC, 125V Station DC and Offsite Power Systems, which are separately evaluated as license renewal systems. Portions of the Offsite Power System are used to recover from a station blackout event and restore normal power, as further described in the Offsite Power System scoping discussion in LRA Section 2.5.1.13. Also not included in the scoping boundary are the underground duct bank, cable trench, conduits and manholes for the cables and the foundations for the switchgears, transformer and load break switches which are evaluated with structures in Section 2.4.

For additional detail, see UFSAR Section 8.3.4 and 15.9.

Reason for Scope Determination

The Station Blackout System is not in scope under 10 CFR 54.4(a)(1) because no portions of the system are safety related or relied on to remain functional during and following design basis events. It is not in scope under 10 CFR 54.4(a)(2) because failure of non-safety related portions of the system will not prevent satisfactory accomplishment of function(s) identified for 10 CFR 54.4(a)(1). The Station Blackout System meets 10 CFR 54.4(a)(3) because it is relied upon in the safety analyses and plant evaluations to perform a function that demonstrates compliance with the Commission’s regulations for SBO (10 CFR 50.63). The Station Blackout System is not relied upon in any safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulation for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49). or ATWS (10 CFR 50.62).

System Intended Functions

1. Relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commission’s regulations for Station Blackout (10 CFR 50.63). (Provides AAC power for SBO coping period.) 10 CFR 54.4(a)(3)

UFSAR References

8.3.4
15.9

License Renewal Boundary Drawings

LR-BR-3000

Table 2.5.1.19 Station Blackout System
Components Subject to Aging Management Review

Component Type	Intended Functions
Combustion Turbine Power Plant	See Section 2.5.1.19

The aging management review results for these components are provided in
Table 3.6.2.1.2 Station Blackout System
-Summary of Aging Management Evaluation

2.5.2 ELECTRICAL COMMODITY GROUPS

2.5.2.1 Identification of Electrical Commodity Groups

The first step of the screening process for electrical components involved using plant documentation to identify the electrical component types within the electrical, mechanical and civil/structural systems based on plant design documentation, drawings, the CRL, and by interfacing with the parallel mechanical and civil screening efforts. These component types were grouped into a smaller set of electrical commodity groups identified from a review of NEI 95-10 Appendix B, NUREG-1801 and information from previous License Renewal applications. The electrical commodity groups identified at Oyster Creek are listed in the table below. This list includes all electrical commodity groups listed in NEI 95-10 Appendix B in addition to commodity groups added per NUREG-1801 or unique to Oyster Creek.

ELECTRICAL COMMODITY GROUPS FOR SYSTEMS AND STRUCTURES

Alarm Units	High Voltage Insulators	Regulators	Transmission Conductors & Connections
Analyzers	Indicators	Relays	Uninsulated Ground Conductors
Annunciators	Insulated Cables & Connections	Detectors (RTDs, etc.)	Wooden Utility Poles
Batteries	Inverters	Sensors	Cable Connections (metallic parts)
Chargers	Isolators	Solenoid Operators	
Circuit Breakers	Light Bulbs	Signal Conditioners	
Converters	Load Centers	Solid State Devices	
Communication Equipment	Loop Controllers	Splices	

Electrical Controls and Panel Internal Component Assemblies	Meters	Surge Arresters	
Electrical Penetrations	Motor Control Centers	Switches	
Elements	Motors	Switchgear	
Fuses	Phase Bus	Switchyard Bus	
Fuse Holders (NUREG 1801)	Power Distribution Panels	Terminal Blocks	
Generators	Power Supplies	Thermocouples	
Heat Tracing	Radiation Monitors	Transducers	
Heaters	Recorders	Transmitters	

2.5.2.2 Application of Screening Criterion 10 CFR 54.21(a)(1)(i) to the Electrical Commodity Groups

Following the identification of the electrical commodity groups, the criteria of 10 CFR 54.21(a)(1)(i) were applied to identify commodity groups that perform their intended functions without moving parts or without a change in configuration or properties. The following electrical component commodity groups were determined to meet the screening criteria of 10 CFR 54.21(a)(1)(i).

- Cable Connections (Metallic Parts)
- Electrical Penetrations
- Fuse Holders
- High Voltage Insulators
- Phase Bus
- Insulated Cables and Connections
- Splices
- Switchyard Bus
- Terminal Blocks
- Transmission Conductors and Connections
- Uninsulated Ground Conductors
- Wooden Utility Poles

2.5.2.3 Elimination of Commodity Groups With No License Renewal Intended Functions

The following electrical commodity groups were eliminated for the reasons stated:

- Phase Bus exists only in the Main Generator and Auxiliaries System. That system has no electrical intended functions and is in scope for 10 CFR 54.4(a)(2) systems interaction only. Because the phase bus contains no fluid, it has no license renewal intended functions.
- Switchyard Bus was eliminated because none perform a license renewal intended function. Rather, transmission conductors, high voltage insulators and insulated cables and connectors perform the functions of providing offsite power to cope with and recover from regulated events.

2.5.2.4 Application of Screening Criterion 10 CFR 54.21(a)(1)(ii) to Electrical 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 components identified for exclusion by the criteria of §54.21(a)(1)(ii) are electrical components included in the Oyster Creek 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 components within the Oyster Creek EQ Program are subject to aging management review (AMR) in accordance with the screening criteria of §54.21(a)(1)(ii). Therefore, the electrical components in the EQ Program were screened out. See Section 4.4 for the TLAA evaluation of the Oyster Creek EQ Program.

The remaining commodity groups, all or part of which are not in the EQ Program, require an AMR. These commodity groups are discussed below.

2.5.2.5 Electrical Commodity Groups Subject to Aging Management Review

The electrical commodity groups subject to aging management review are identified in Table 2.5.2, along with the associated intended functions. These electrical commodity groups are further described below.

2.5.2.5.1 Insulated Cables and Connections

The insulated cables and connections commodity group was broken down for aging management review of insulation into subcategories based on their treatment in NUREG 1801:

- Insulated Cables and Connections
- Insulated Cables and Connections Used In Instrumentation Circuits
- Insulated Inaccessible Medium Voltage Cables

The types of connection insulation included in this review include splices, connectors and terminal blocks. Fuse holders were reviewed separately.

Numerous insulated cables and connections are included in the EQ Program and, therefore, are not subject to an aging management review in accordance with the screening criteria of 10 CFR 54.21(a)(1)(ii). Insulated cables and connections not included in the EQ Program meet the criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

Insulated cables and connections inside the enclosure of an active device (e.g., motor leads and connections, and cables and connections internal to relays, chargers, switchgear, transformers, power supplies, etc.) are maintained along with the other subcomponents and piece-parts inside the enclosure and are not subject to aging management review.

2.5.2.5.2 Electrical Penetrations

The electrical portions of many Oyster Creek electrical penetration assemblies are included in the EQ Program and, therefore, do not meet the criterion of 10 CFR 54.21(a)(1)(ii) and are not subject to an aging management review. The electrical portions of those electrical penetrations which are not included in the EQ Program meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review. The electrical insulation within the penetration assembly was reviewed as well as the epoxy potting compound that provides the sealing function. Insulated cable pigtails are considered part of the Insulated Cables and Connectors commodity group. Metallic portions of the electrical penetrations are considered part of the Primary Containment structure.

2.5.2.5.3 High Voltage Insulators

High voltage insulators are provided on the circuits used to supply power from the switchyard to plant buses during recovery from a station blackout or fire protection event and are not included in the EQ program. Therefore, high voltage insulators meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

2.5.2.5.4 Transmission Conductors and Connections

Transmission conductors provide a portion of the circuits used to supply power from the switchyard to plant buses during recovery from a station blackout or fire protection event and are not included in the EQ program. Therefore, transmission conductors meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

2.5.2.5.5 Fuse Holders

Fuse holders not included in the EQ Program comprise this commodity group. Both the metallic and non-metallic portions of fuse holders not included in the EQ Program meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

2.5.2.5.6 Wooden Utility Poles

Wooden utility poles did not fit within an existing electrical commodity group, so separate commodity group was created. Utility poles provide structural support for transmission conductors, high voltage insulators and other active electrical components that supply power from the switchyard to plant buses during recovery from a station blackout or fire protection event and are not included in the EQ Program. Therefore, wooden utility poles meet the screening criterion of 10 CFR 54.21(a)(1)(ii) and are subject to an aging management review.

2.5.2.5.7 Cable Connections (Metallic Parts)

The Cable Connections commodity group includes the metallic portions of cable connections that are not included in the EQ Program. The metallic connections evaluated include splices, threaded connectors, compression-type termination lugs and terminal blocks.

2.5.2.5.8 Uninsulated Ground Conductors

The uninsulated ground conductors commodity group is comprised of grounding cable and associated connectors.

Table 2.5.2 Electrical Commodity Groups
Components Subject to Aging Management Review

Component Type	Intended Functions
Cable Connections (Metallic Parts)	Electrical Continuity
Electrical penetrations	Electrical Continuity (pigtails)
	Pressure Boundary
Fuse Holders	Electrical Continuity
	Insulation - Electrical
High Voltage Insulators	Insulation - Electrical
Insulated cables and connections	Electrical Continuity
Insulated cables and connections in instrumentation circuits	Electrical Continuity
Insulated inaccessible medium-voltage cables	Electrical Continuity
Transmission conductors and connections	Electrical Continuity
Uninsulated Ground Conductors	Electrical Continuity
Wooden Utility Poles	Structural Support

The aging management review results for these components are provided in
Table 3.6.2.1.1 Electrical Commodity Groups
-Summary of Aging Management Evaluation

3.0 AGING MANAGEMENT REVIEW RESULTS

For those structures and components that are identified as being subject to an aging management review, 10 CFR 54.21(a)(3) requires demonstration that the effects of aging will be adequately managed so that their intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

This section describes the results of the aging management reviews of the structures and components determined, during the scoping and screening processes, to be subject to an aging management review. Organization of this section is based on Tables 1 through 6 of Volume 1 of NUREG-1801, Generic Aging Lessons Learned (GALL), draft dated January 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), draft dated January 2005. The use of the draft January 2005 GALL Report is in accordance with the January 13, 2005 meeting between the NRC and NEI on updating license renewal guidance documents, as summarized and documented in a meeting summary dated February 17, 2005 (ML050490142).

Descriptions of the internal and external service environments that were used in the aging management review to determine aging effects requiring management are provided in Table 3.0-1 and Table 3.0-2. These tables also identify the equivalent NUREG-1801 environments. A description of the passive component materials identified in the Oyster Creek LRA is provided in Table 3.0-3. This table provides the Oyster Creek nomenclature used and the equivalent NUREG-1801 material identification. A description of the aging effects identified in the Oyster Creek LRA is provided in Table 3.0-4. This table also provides the equivalent NUREG-1801 aging effects.

This section is subdivided according to the following system groupings:

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 Containment, Structures, Component Supports, and Piping and Component Insulation

3.6 Aging Management of Electrical Components

NUREG-1801 is the NRC Staff's generic evaluation of existing plant programs. The evaluation results documented in the report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components within the scope of license renewal, without change. The report also contains recommendations on specific areas for augmentation of existing programs for license renewal. In order to take full advantage of NUREG-1801, a comparison is made between the AMR results and the tables of NUREG-1801. The results of this comparison are provided in the following two tables:

Table 3.x.1 – where '3' indicates LRA Section 3; 'x' indicates the subsection 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 type is referred to as "Table 1."

Table 3.x.2.1.y – where '3' indicates LRA Section 3.0; 'x' indicates the subsection number; '2' indicates the second table type; '1' indicates the summary subsection for materials, environments, aging effects and aging management programs; 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 Internals would be 3.1.2.1.4; and for the Reactor Vessel would be 3.1.2.1.5. Also, within Section 3.2 for Engineered Safety Features, this table would be 3.2.2.1.1, for the Containment Spray System; and the next system, Core Spray, has a table numbered 3.2.2.1.2. This table type is referred to as "Table 2."

FURTHER EVALUATION TEXT

In those cases where NUREG-1801, Volume 1 recommends "further evaluation" of an item by the reviewer, separate text sections are provided as an aid in these evaluations. These text sections provide the Oyster Creek positions for each item and address the issues raised in the "further evaluation recommended" sections of NUREG-1800, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants. The LRA "further evaluation" section numbering aligns with the applicable issue text in Section 3 of NUREG-1800. For example, the first line item in NUREG-1801, Volume 1, Table 1 relates to fatigue of reactor coolant pressure boundary components. The "Further Evaluation Recommended" column notes that further evaluation is recommended. Discussion of review requirements for this item is outlined in Section 3.1.2.2.1 of NUREG-1800. Correspondingly, Section 3.1.2.2.1 of the LRA provides a discussion of the associated Oyster Creek position and aging management review results for the item. This correlation continues for all of the further evaluation items in Sections 3.1 through 3.6 of NUREG-1800.

Table Description

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 extended period of operation. The evaluation results documented in the report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components. The GALL Report also contains recommendations on the specific areas for which existing programs should be augmented for license renewal. In order to take full advantage of NUREG-1801, a comparison between the AMR results and the tables of NUREG-1801 has been made. The results of that comparison are provided in the tables in this section.

The purpose of Table 1 is to provide a summary comparison of specific plant AMR details with the corresponding tables of NUREG-1801, Volume 1. The table is essentially the same as Tables 1 through 6 of NUREG-1801, Volume 1, except that the “Type” column has been replaced by an “Item Number” column and the “Related Item” column has been replaced by a “Discussion” column. The “Item Number” column provides the reviewer with a means to cross reference from Table 2 to Table 1. The “Discussion” column is used to provide clarifying or amplifying information. The following are examples of information that might be contained within this column.

- “Further Evaluation Recommended” information or reference to where that information is located
- The name of a plant-specific program being used
- Exceptions to the NUREG-1801 assumptions
- A discussion of how the line is consistent with the corresponding line item in NUREG-1801, Volume 1, when it may appear inconsistent
- A discussion of how the item is different from the corresponding line item in NUREG-1801, Volume 1, when it may appear to be consistent (e.g., when there is exception taken to an aging management program that is listed in NUREG- 1801)

The format of Table 1 provides the reviewer with a means of aligning a specific Table 1 row with the corresponding NUREG-1801, Volume 1, table row, thereby allowing for the ease of checking consistency.

Table 2 provides the detailed results of the aging management reviews for those components/commodities identified in LRA Section 2 as being subject to aging management review. There will be a Table 2 for each of the systems within the associated system grouping. Table 2 consists of the following nine columns:

Component Type – The first column identifies the components from Section 2 that are subject to aging management review. They are listed in alphabetical order, and are the same as listed in the Section 2 Tables.

Intended Function – The second column contains the license renewal component intended functions for the listed component types. Definitions of intended functions are contained in Table 2.1-1.

Material – The third column lists the particular materials of construction for the component/commodity group. A description of passive component materials is provided in Table 3.0-3.

Environment – The fourth column lists the environment to which the component types are exposed. Internal and external service environments are indicated. The environments used in the Oyster Creek aging management reviews are listed below in Tables 3.0-1 and 3.0-2.

Aging Effect Requiring Management – As part of the aging management review process, aging effects requiring management are identified for material and environment combinations. The aging effects requiring management are those effects that must be managed to maintain the component intended function for the period of extended operation. These are listed in the fifth column.

The Oyster Creek aging management review methodology is based on generic industry guidance for determining aging effects, based on the materials of construction and applicable environmental conditions. The aging effects are derived from known age-related degradation mechanisms, industry operating experience and Oyster Creek operating experience. Sources of applicable aging effects include EPRI Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools - Revision 3, NUREG-1801, and previous license renewal applications and associated NRC Safety Evaluation Reports.

Aging Management Programs – The aging management programs used to manage the aging effects requiring management are identified in the sixth column of Table 2. Aging management programs are described in Appendix B.

NUREG-1801, Volume 2 Item – Each combination of component, material, environment, aging effect and aging management program that is listed in Table 2, is compared to NUREG-1801, Volume 2, with consideration given to the standard notes, to identify consistency. Consistency is documented by noting the appropriate NUREG-1801, Volume 2, item number in the seventh column of Table 2. If there is no corresponding item number in NUREG-1801, Volume 2, this row in the seventh column is left blank. Thus, a reviewer can readily identify the correlation between the plant-specific tables and the NUREG-1801, Volume 2, tables.

Table 1 Item – When a NUREG-1801, Volume 2 item is identified in the seventh column, a corresponding Table 1 (LRA Table 3.x.1) summary item number is indicated in the eighth column. The Table 1 summary item number is based on the sequential "ID" column number in Tables 1 through 6 of NUREG-1801, Volume 1. The applicable Table 1 summary item number is derived from correlation of the "Related Item" in Tables 1 through 6 of NUREG-1801, Volume 1 with the Volume 2 item number in the seventh column.

Notes – The notes provided in each Table 2 describe how the information in the table aligns with the information in NUREG-1801. Each Table 2 contains both standard "lettered" notes and plant specific "numbered" notes.

The standard "lettered" notes (e.g., A, B, C…) provide generic information regarding comparison of the Oyster Creek aging management strategy with the NUREG-1801, Volume 2 Aging Management Table line item identified in the seventh column.

Generic notes A through E indicate that a useful comparison may be made between the Table 2 line item and NUREG-1801. Therefore, items associated with notes A through E will also contain a NUREG-1801 Volume 2 item and a reference to a Table 1 item. Generic note I will also include a NUREG-1801 Volume 2 item and a reference to a Table 1 item, with a plant specific (numbered) note justifying the lack of the GALL aging effect.

Notes F, G, H and J denote differences in material, environment, or aging effect requiring management that preclude a reviewer comparison. When these notes are utilized, no NUREG-1801, Volume 2 Aging Management Table item is associated with the Oyster Creek line item.

The plant-specific numbered notes (e.g., 1, 2, 3…) provide plant-specific information or clarification. These notes may indicate why an aging effect is or is not included, provide details regarding program application, or describe differences between the Oyster Creek item and corresponding NUREG-1801, Volume 2 Aging Management Table items.

Notes are shown for each system, immediately following the Table 2 for the system.

TABLE 1 USAGE

The reviewer evaluates each row in Table 1 by moving from left to right across the table. No evaluation of information in the Component, Aging Effect/ Mechanism, Aging Management Program or Further Evaluation Recommended columns is required, as this information is taken directly from NUREG-1801, Volume 1. The Discussion column provides the information of most use to the reviewer and summarizes the information necessary to determine how the aging management review results align with NUREG-1801, Volume 1.

TABLE 2 USAGE

Table 2 provides the aging management review information for the plant, irrespective of any comparisons to NUREG-1801. In a given row in the table, the reviewer can see the intended function, material, environment, aging effect requiring management, and aging management program combination for a component type. 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 to verify the correlation. If the column is blank, no correlation to NUREG-1801, Volume 2 was identified. As the reviewer continues across the table from left to right in a row, the next column is labeled Table 1 Item. If there is a reference number to a corresponding row in Table 1, the reviewer can refer to Table 1 to determine how the aging management program for this combination aligns with NUREG-1801. Table 2 provides a reviewer with a means to navigate from the components subject to an aging management review in LRA Section 2 through the evaluation of aging management programs used to manage the effects of aging for the plant structures and components.

The NUREG-1801 Volume 2 tables are generally provided by system and structure. When making the correlations between the Oyster Creek components and NUREG-1801, matches within the equivalent or comparable NUREG system or structure were sought first. If a match could not be found in the equivalent system or structure, or if there was no equivalent NUREG system or structure, then matches were sought elsewhere within the same NUREG section, e.g., the Engineered Safety Features or Auxiliary Systems NUREG section. If a match could not be found within the same NUREG section, then a match was sought from other NUREG sections.

Cumulative Fatigue Damage and TLAAs in Table 2

A Fatigue analysis is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). For those components subject to cumulative fatigue usage, the impact on existing TLAAs was evaluated and is addressed in Section 4.3.

Where specified by NUREG-1801 Volume 2, the following rules were used when applying TLAA to the aging effects associated with cumulative fatigue for a component:

1. For RCPB components, a TLAA is applied for the aging effects of cumulative fatigue to all piping.

2. In addition, TLAA is conservatively applied to RCPB piping components and piping elements, including valves, flow elements and thermowells, based on the NUREG-1801 definition of piping elements.

3. For non-RCPB components, a TLAA is applied for the aging effects of cumulative fatigue to piping only.

The use of TLAA in the following tables indicates that the current licensing basis was reviewed for TLAAs and the fatigue analysis was evaluated where one exists for that component. However, not every component has an explicit fatigue analysis. In the absence of an explicit fatigue analysis for a component, the effects of cumulative fatigue are managed by the other aging management programs for that component. For example, cumulative fatigue effects in bolting are managed by the Bolting Integrity program. Additionally, as stated in Section 4.3.3, piping and piping components were designed to codes and standards that require application of stress range reduction factors to account for cyclic thermal conditions. Maintaining plant thermal cycles within the limit (7000 cycles) ensures piping, piping components, and bolting are within fatigue limits.

Table 3.0-1 – Oyster Creek Internal Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Auxiliary Steam [1]	Heating and process steam produced from heating boiler using Boiler Treated Water.	Steam
Boiler Treated Water [1]	Demineralized water subject to chemistry controls specified in the plant Auxiliary Boiler Chemistry procedure.	Treated Water
Closed Cooling Water	Treated water subject to water chemistry controls recommended in EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines." Closed Cooling Water includes Reactor Building Closed Cooling Water (RBCCW), and Turbine Building Closed Cooling Water (TBCCW).	Closed cycle cooling water
Closed Cooling Water < 140°F [2]	Closed cooling water below the temperature threshold for SCC in austenitic stainless steel components.	Closed cycle cooling water
Condensation	Condensation environment applies to internal surfaces of design features, such as drain traps, provided to collect potential moisture in gas or air systems.	Condensation (Internal/External)

[1] This environment is not an exact match of the environment defined in NUREG-1801 because water chemistry is controlled to different guidelines. However for aging management review considerations it is considered equivalent.

[2] This environment is not an exact match of environments defined in NUREG-1801; however it is bounded by the listed equivalent NUREG-1801 environment.

Table 3.0-1 – Oyster Creek Internal Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Containment Atmosphere	This environment is inert with nitrogen to render the atmosphere non-flammable by maintaining the oxygen content below 4% by volume. The average normal temperature inside the drywell is 139°F, with a humidity range of 20-40%. The upper elevations (above elev. 95') of the drywell could be exposed to higher temperatures, up to 256°F.	Air – Indoor Uncontrolled
Diesel Engine Exhaust gases	Gas present in diesel engine exhaust	Diesel Exhaust
Dry Gas	Carbon dioxide, halon, helium, dried air, hydrogen, oxygen, nitrogen	Gas Air, Dry
Fuel Oil	Diesel oil used for the combustion engines and heating boilers.	Fuel Oil
Indoor Air	Air in a sheltered environment, other than containment atmosphere. Air temperature range is 65°F - 140°F and the humidity is 100% maximum	Air – Indoor Uncontrolled
Lubricating Oil	Low to medium viscosity hydrocarbons used for lubrication of rotating equipment.	Lubricating Oil
Outdoor Air	Outdoor air environment is subject to local weather conditions. The mean temperature range is 23.7°F - 84°F and the average annual precipitation is approximately 42 inches.	Air - Outdoor

Table 3.0-1 – Oyster Creek Internal Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Raw Water – Fresh Water	Fresh raw water is drawn from either a deep well or from the Fire Pond Dam. Water taken from the deep wells is processed in the pretreatment facility and used for domestic water or treated further and used as Demineralized water and for make up to the condensate storage and transfer system. Fresh water drawn from the Fire Pond Dam is untreated and is used for fire suppression and to the circulating water and service water pumps seals, and dilution pump oil coolers. Recent chemistry results show that the pH = 4.8, chlorides = 12 ppm, and sulfates = 6 ppm.	Raw Water
Raw Water – Salt Water	Raw salt water is drawn from Barnegat Bay, which receives salt water from the Atlantic Ocean and fresh water runoff from streams, which border it on the western shore, including Oyster Creek and Forked River. Recent tests of water samples taken at the Intake Structure and Canal showed that the pH = 7.9, Chlorides =14659 ppm, and Sulfates 1419 ppm. The average monthly water temperature range is 37^{o}F in the winter and 80^{o}F in summer	
Refrigerant	Inert gases such as Freon commonly used in refrigeration and air conditioning systems.	Gas
Sodium Pentaborate	This environment consists of treated water containing sodium pentaborate solution. The environment is found only in Standby Liquid Control System (Liquid Poison System)	Sodium pentaborate solution
Steam	Steam that is subject to BWR water chemistry controls	Steam

Table 3.0-1 – Oyster Creek Internal Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Treated Water	Treated water is demineralized water and is the base water for all clean systems. Depending on the system, this demineralized water may require additional processing. Treated water can be deaerated, include corrosion inhibitors, biocides, or some combination of these treatments. Treated water is subject to BWR water chemistry controls. Treated water includes reactor grade water, spent fuel pool water, torus water, and demineralized water.	Treated Water Reactor Coolant
Treated Water < $140^{o}F$ [1]	Treated Water below the temperature threshold for SCC in austenitic stainless steel components.	Treated Water
Treated Water > $482^{o}F$	Treated water above thermal embrittlement threshold for CASS components.	Treated Water > $482^{o}F$

[1] This environment is not an exact match of environments defined in NUREG-1801; however it is bounded by the listed equivalent NUREG-1801 environment

Table 3.0-2 – Oyster Creek External Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Adverse localized Environment	Environment, which could exist in limited plant areas caused by heat, radiation, moisture or voltage in the presence of oxygen. Used for electrical insulation only.	Adverse Localized Environment
Aggressive Environment[1]	Ground water and raw water environments are considered aggressive if pH < 5.5, or chlorides > 500 ppm, or sulfates > 1500 ppm.	Aggressive Environment
Boiler Treated Water[2]	Demineralized water subject to chemistry controls recommended by the boiler manufacturer. Water chemistry controls are implemented through plant procedures.	Treated Water
Closed Cooling Water	Treated water subject to water chemistry controls recommended in EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines." Closed Cooling Water includes Reactor Building Closed Cooling Water (RBCCW), and Turbine Building Closed Cooling Water (TBCCW).	Closed cycle cooling water
Closed Cooling Water < 140^{o}F[3]	Closed cooling water below the temperature threshold for SCC in austenitic stainless steel components.	Closed cycle cooling water
Concrete	Embedded or Encased in concrete	Concrete

[1] This environment is not an exact match of aggressive environment defined in NUREG-1801, Table IX.D. However it is an exact match of the aggressive environment used in NUREG-1801 AMR tables, for example line Item III.A3-4 (T-05).

[2] This environment is not an exact match of the environment defined in NUREG-1801 because water chemistry is controlled to different guidelines. However for aging management review considerations it is considered equivalent.

[3] This environment is not an exact match of environments defined in NUREG-1801; however it is bounded by the listed equivalent NUREG-1801 environment

Table 3.0-2 – Oyster Creek External Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Containment Atmosphere	This environment is inert with nitrogen to render the atmosphere non-flammable by maintaining the oxygen content below 4% by volume. The average normal temperature inside the drywell is 139°F, with a humidity range of 20-40%. The upper elevations (above elev. 95') of the drywell could be exposed to higher temperatures, up to 256°F. For bolting this environment includes potential leakage of treated water, steam, or raw water.	Air – Indoor Uncontrolled Air with Reactor Coolant Leakage Air with Steam or Water Leakage
Dry Gas	Nitrogen	Gas Air, Dry
Encased	Applies to components encapsulated in steel, or aluminum. Encased components are inaccessible, and not exposed to air, water, or other environments.	Environment not in NUREG-1801
Fuel Oil	Diesel oil used for the combustion engines and heating boilers.	Fuel Oil
Indoor Air	Air in a sheltered environment, other than containment atmosphere. Air temperature range is 65°F - 140°F and the humidity is 100% maximum. For bolting this environment includes potential leakage of treated water, steam, sodium pentaborate, or raw water.	Air – indoor Uncontrolled Air with Reactor Coolant Leakage Air with Steam or Water Leakage
Lubricating Oil	Low to medium viscosity hydrocarbons used for lubrication of rotating equipment.	Lubricating Oil
Outdoor Air	Outdoor air environment is subject to local weather conditions. The mean temperature range is 23.7°F - 84°F and the average annual precipitation is approximately 42 inches.	Air - Outdoor

Table 3.0-2 – Oyster Creek External Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Raw Water – Fresh Water	Fresh raw water is drawn from either a deep well or from the Fire Pond Dam. Water taken from the deep wells is processed in the pretreatment facility and used for domestic water or treated further and used as Demineralized water and for make up to the condensate storage and transfer system. Fresh water drawn from the Fire Pond Dam is untreated and is used for fire suppression and to the circulating water and service water pumps seals, and dilution pump oil coolers. Recent chemistry results show that the pH = 4.8, chlorides = 12 ppm, and sulfates = 6 ppm.	Raw Water
Raw Water – Salt Water	Raw salt water is drawn from Barnegat Bay, which receives salt water from the Atlantic Ocean and fresh water runoff from streams, which border it on the western shore, including Oyster Creek and Forked River. Recent tests of water samples taken at the Intake Structure and Canal showed that the pH = 7.9, Chlorides =14659 ppm, and Sulfates 1419 ppm. The average monthly water temperature range is 37^{o}F in the winter and 80^{o}F in summer.	
Soil	External environment for structures and components buried in soil. Buried structures and components may be exposed to groundwater if they are located below the local ground water elevation. Site groundwater has been tested and determined non-aggressive to concrete.	Soil
Steam	Steam that is subject to BWR water chemistry controls	Steam

Table 3.0-2 – Oyster Creek External Service Environments

Oyster Creek Environment	Description	Equivalent NUREG-1801 Environment
Treated Water	Treated water is demineralized water and is the base water for all clean systems. Depending on the system, this demineralized water may require additional processing. Treated water can be deaerated, include corrosion inhibitors, biocides, or some combination of these treatments. Treated water is subject to BWR water chemistry controls. Treated water includes reactor grade water, spent fuel pool water, torus water, and demineralized water.	Treated water
Treated Water < 140^{o}F[1]	Treated Water below the temperature threshold for SCC in austenitic stainless steel components.	Treated water
Treated Water > 482^{o}F	Treated water above thermal embrittlement threshold for CASS components.	Treated water > 482^{o}F
Water – flowing	Water that is refreshed, thus having larger impact on leaching of calcium hydroxide from concrete structures.	Water - flowing
Water - standing	Water that is stagnant and un-refreshed, thus possibly resulting in increased ionic strength of solution up to saturation	Water - standing

[1] This environment is not an exact match of environments defined in NUREG-1801; however it is bounded by the listed equivalent NUREG-1801 environment

Table 3.0-3 – Oyster Creek Passive Component Materials

Oyster Creek Material	Equivalent NUREG-1801 Material	Comments
Alloy steel	Steel	Alloy steel closure bolting with yield strength < 150 ksi; except for the reactor vessel bolting, and bolting in the Control Rod Drive system which are high-strength bolting (yield > 150 ksi)
Aluminum	Aluminum	
Alumina Silica	Material not in NUREG-1801	Alumina silica consists of high temperature ceramic fibers and inorganic binders. The material is used in fire rated barriers.
Aluminum bronze	Copper alloy	
Asbestos (Thermal Insulation)	Material not In NUREG-1801	Fibrous material used for thermal insulation of piping and components
Boraflex	Boraflex	
Boral	Boral	
Brass	Copper alloy	
Bronze	Copper alloy	
Calcium Silicate (Thermal Insulation)	Material not In NUREG-1801	Thermal insulation material manufactured from mineral fiber and molded or shaped to easily fit around piping and components
CASS	Cast austenitic stainless steel (CASS)	
Carbon and low alloy steel	Steel	
Cast Iron	Steel Gray cast iron	For Oyster Creek, cast iron is treated as gray cast iron and subject to loss of material due to selective leaching.

Table 3.0-3 – Oyster Creek Passive Component Materials

Oyster Creek Material	Equivalent NUREG-1801 Material	Comments
Chrome Moly	Steel	Chrome Moly is not specifically identified in NUREG-1801. The material provides high resistance to loss of material due to flow-accelerated corrosion (FAC). However it is conservatively treated as carbon steel.
Concrete	Concrete	
Copper	Copper alloy <15% Zn	
Copper Alloy	Copper alloy > 15% Zn	
Elastomer	Elastomer	Butyl, Rubber, Neoprene, silicones
Epoxy Potting	Material not in NUREG-1801	Epoxy resin material used as a pressure boundary for containment electrical penetrations.
Fiberglass (Thermal Insulation)	Material not in NUREG-1801	Semi-rigid fibrous glass quilted between two layers of scrim and encapsulated in a fiberglass cloth, jackets, forming a composite blanket; or pre-molded fiberglass modules and panels encased in fiberglass jackets.
Galvanized steel	Galvanized Steel	
Glass	Glass	
Gravel, Sand	Material not in NUREG-1801	Crushed stone and sand used for tank foundations.
Grout	Grout	
Gypsum board	Material not in NUREG-1801	Wallboard used in fire barriers.
Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate	Insulation materials (e.g. bakelite, phenolic melamine or ceramic, molded polycarbonate)	

Table 3.0-3 – Oyster Creek Passive Component Materials

Oyster Creek Material	Equivalent NUREG-1801 Material	Comments
High strength alloy steel	Low-alloy steel, yield strength >150 ksi	Closure bolting for the reactor vessel and in the Control Rod Drive system.
Lubrite	Lubrite	
Masonry	Concrete block	
Mecatiss	Material Not NUREG-1801	Mecatiss is a trade name for fire barrier material. It consists of layers of mineral wool covered internally and externally by fiberglass cloth, which is saturated with a patented silicon sealer. Each layer of wool and cloth is also coated with patented mastic glue, which forms heat and moisture barriers.
Nickel alloy	Nickel alloys	
NUKON (Thermal Insulation)	Material Not in NUREG-1801	NUKON insulation system consists of fiberglass blankets, modules, or panels used for thermal insulation of piping and components inside the primary containment drywell.
Permali	Material Not in NUREG-1801	Trade name for a composite material used for shielding purposes in the primary containment biological shield wall penetrations.
Plexiglass	Material Not in NUREG-1801	Plexiglass is clear plastic material (Lucite) used in the Standby Gas Treatment ductwork.
Polyethylene	Material Not in NUREG-1801	
Polymers	Polymer (e.g., rubber)	Polymers in the Oyster Creek LRA are plastic materials. Rubbers are addressed as elastomers.
Polypropylene	Material Not in NUREG-1801	Polypropylene is a thermoplastic material with good resistance to strong acids, weak to strong alkalis, and most organic solvents. The material is used for chlorination system piping

Table 3.0-3 – Oyster Creek Passive Component Materials

Oyster Creek Material	Equivalent NUREG-1801 Material	Comments
Polyvinyl chloride (PVC, CPVC)	Material Not in NUREG-1801	PVC and CPVC piping and fitting and conduits.
Porcelain, Malleable iron, aluminum, galvanized steel, cement	Porcelain, Malleable iron, aluminum, galvanized steel, cement	Used for High Voltage Insulators
Pyrocrete	Material Not in NUREG-1801	Used as Fire Barrier
Roofing Material	Material Not in NUREG-1801	Built-up roofing materials (waterproofing membrane, felt, tar, flashing, etc.) for structures,
Stainless steel	Stainless steel	
Tar	Material Not in NUREG-1801	Bituminous materials used for sealing concrete joints, and intake canal slope protection.
Thermo-Lag	Material Not in NUREG-1801	Used as Fire Barrier
Titanium	Material Not in NUREG-1801	Heat exchanger titanium tubes.
Treated wood	Material Not in NUREG-1801	Pressure treated utility poles, wood piles and wood sheeting used in water control structures.
Various (Gravel, Tar, Soil, wood, galvanized steel)	Various	Material that make dams, canals, and other earthen water control structures
Various metals used for electrical connections	Various metals used for electrical contacts	
Various organic polymers (e.g. EPR, XLPE, PVC, ETFE)	Various organic polymers (e.g. EPR, SR, EPDM, XLPE)	Polymers used in electrical applications
Zinc	Material Not in NUREG-1801	

Table 3.0-4 – Oyster Creek Aging Effects

Oyster Creek Aging Effects	Description or Explanation	Equivalent NUREG-1801 Aging Effects
Change in Material Properties • Concrete	Change in material properties is used to designate loss of bond, increase in porosity and permeability, and loss of strength listed in NUREG-1801. Change in material properties is evidenced in concrete structures and structural members as increased permeability, increased porosity, reduction in pH, reduction in tensile strength, reduction in compressive strength, reduction in modulus of elasticity, and reduction in bond strength.	Loss of Bond/ Corrosion of Rebar Increase in Porosity and Permeability/Aggressive Chemical Attack Increase in Porosity and permeability, Loss of Strength/ Leaching Hydroxide Increase in Porosity, Permeability/ Leaching of Calcium Hydroxide Reduction of Strength and Modulus/ Elevated Temperature (>150° F general; >200° F local)
Change in Material Properties • Elastomer	Change in material properties is used to designate increased hardness, shrinkage and loss of strength due to weathering and hardening and loss of strength due to elastomer degradation.	Increased Hardness, Shrinkage and loss of strength/ Weathering Hardening and Loss of Strength/ Elastomer Degradation
Cracking • Concrete	Cracking in concrete may be due to reaction with aggregate, corrosion of embedded steel, freeze-thaw, aggressive chemical attack, elevated temperature, shrinkage, and settlement. Aging mechanisms are not specifically listed in the AMR tables. However, the applicable mechanisms are addressed as indicated by NUREG-1801 Vol. 2 Item line number.	Expansion and Cracking/ Reaction with Aggregate Loss of Material (Spalling, Scaling) and Cracking/ Freeze-Thaw Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)/ Corrosion of Embedded Steel Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scalling)/ Aggressive Chemical Attack Cracks and distortion due to increased stress levels from settlement
Cracking • Masonry	Cracking of masonry walls is due to restraint against expansion and contraction, shrinkage, and creep. The walls are not exposed to aggressive environment.	Cracking due to Restraint shrinkage, Creep, and Aggressive Environment

Table 3.0-4 – Oyster Creek Aging Effects

Oyster Creek Aging Effects	Description or Explanation	Equivalent NUREG-1801 Aging Effects
Cracking Initiation and Growth	This term is synonymous to the “cracking” standardized expression in NUREG-1801. The Oyster Creek AMR tables present aging at the aging effect level and do not specifically list the associated aging mechanisms. However aging management reviews consider the applicable aging mechanisms and the credited aging management programs are reviewed to ensure that the applicable aging mechanisms are adequately managed.	Cracking/ Cyclic Loading Cracking/ Stress Corrosion Cracking Cracking / Stress Corrosion Cracking and Intergranular Stress Corrosion Cracking Cracking / Stress Corrosion Cracking, Intergranular Stress Corrosion Cracking, and Cyclic Loading Cracking/ Stress Corrosion Cracking, Intergranular Stress Corrosion Cracking, Irradiation-assisted Stress Corrosion Cracking Cracking/ Flow-Induced vibration Cracking/ Thermal and Mechanical Loading
Cumulative Fatigue Damage (TLAA)	Cumulative fatigue damage is due to fatigue as defined by ANSI B31.1, ASME III, and ASME VIII.	Cumulative Fatigue Damage
Embrittlement, Cracking, Melting, Discoloration, Swelling, or Loss of Dielectric Strength Leading to Reduced Insulation Resistance (IR); Electric Failure/ Degradation of Organics (Thermal/Thermoxidative), Radioalysis and Photolysis (UV Sensitive Materials only) of Organics; Radiation-induced Oxidation, and Moisture Intrusion	Same as NUREG-1801 Table IX.E	Embrittlement, Cracking, Melting, Discoloration, Swelling, or Loss of Dielectric Strength Leading to Reduced Insulation Resistance (IR); Electric Failure/ Degradation of Organics (Thermal/Thermoxidative), Radioalysis and Photolysis (UV Sensitive Materials only) of Organics; Radiation-induced Oxidation, and Moisture Intrusion
Fretting or Lockup	Same as NUREG-1801 Table IX.E	Fretting or Lockup

Table 3.0-4 – Oyster Creek Aging Effects

Oyster Creek Aging Effects	Description or Explanation	Equivalent NUREG-1801 Aging Effects
Localized Damage and Breakdown of Insulation Leading to Electrical Failure/ Moisture Intrusion, Water Trees	Same as NUREG-1801 Table IX.E	Localized Damage and Breakdown of Insulation Leading to Electrical Failure/Moisture Intrusion, Water Trees
Loss of Form	In earthen water-control structures, loss of form can result from erosion, settlement, sedimentation, frost action, waves, currents, surface runoff, and seepage.	Loss of Form
Loss of Fracture Toughness	Same as NUREG-1801 Table IX.E	Loss of Fracture Toughness/ Thermal Aging Embrittlement Loss of Fracture Toughness/ Neutron Irradiation Embrittlement Loss of Fracture Toughness/ Thermal Aging and Neutron Irradiation Embrittlement
Loss of Leak Tightness	The primary containment personnel/equipment airlock can experience loss of leak tightness in closed position resulting from mechanical wear of locks, hinges, and closure mechanisms	Loss of Leak Tightness

Table 3.0-4 – Oyster Creek Aging Effects

Oyster Creek Aging Effects	Description or Explanation	Equivalent NUREG-1801 Aging Effects
Loss of Material • Metallic materials	Loss of material for metallic materials can be the result of one or more aging mechanism including general corrosion, pitting, crevice corrosion, microbiologically influenced corrosion, fouling, flow-accelerated corrosion, galvanic corrosion, selective leaching, and wear. The Oyster Creek AMR tables present aging at the aging effect level and do not specifically list the applicable aging mechanisms. However the Oyster Creek aging management reviews consider the applicable aging mechanisms and the credited aging management programs are reviewed to ensure that the applicable aging mechanisms are adequately managed. For example loss of material due galvanic corrosion is managed by programs that manage loss of material due to general corrosion, such as water chemistry programs and one-time inspection or by periodic inspections. The NRC staff has found that these activities are adequate to manage loss of material due to galvanic corrosion (D/QC SER NUREG-1796, Section 3.3.2.5). Selective leaching and flow-accelerated corrosion mechanisms are also not specifically listed in the Oyster Creek AMR tables. However loss of material due to selective leaching is evaluated as indicated by the use of the Selective Leaching of Materials program. Loss of material or “Wall Thinning” due to flow-accelerated corrosion is evaluated as indicated by identification of the applicable NUREG-1801 Vol. 2 line number and by the use of Flow-Accelerated Corrosion program.	Loss of Material/ General, Pitting, and Crevice Corrosion Loss of Material/ Corrosion Loss of Material/ General Corrosion Loss of Material/ General (Steel Only), Pitting and Crevice Corrosion Loss of Material/ Pitting, Crevice, and Microbiologically influenced Corrosion, and Fouling Loss of Material/ General, Pitting, Crevice, and Microbiologically Influenced Corrosion Loss of Material/ General and Pitting Corrosion Loss of Material/Microbiologically Influenced Corrosion Loss of Material/ Pitting and Crevice Corrosion Loss of Material/ Pitting and Crevice Corrosion, and Fouling Loss of Material/ Pitting, Crevice, and Galvanic Corrosion Loss of Material/ Selective Leaching Loss of Material/ Selective Leaching and General Corrosion Loss of Material/ Wear Wall Thinning/ Flow-Accelerated Corrosion

Table 3.0-4 – Oyster Creek Aging Effects

Oyster Creek Aging Effects	Description or Explanation	Equivalent NUREG-1801 Aging Effects
Loss of Material • Concrete	Loss of material in concrete may be due to corrosion of embedded steel, freeze-thaw, aggressive chemical attack, and abrasion or cavitation. Aging mechanisms are not specifically listed in the Oyster Creek AMR tables. However, the applicable mechanisms are addressed as indicated by NUREG-1801 Vol. 2 Item line number.	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)/ Corrosion of Embedded Steel Loss of Material (Spalling, Scaling) and Cracking/ Freeze-Thaw Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scalling)/ Aggressive Chemical Attack Loss of Material/ Abrasion; Cavitation Loss of Material/ Corrosion of Embedded Steel
Loss of Material, Loss of Form	Same as NUREG-1801 Table IX.E	Loss of Material, Loss of Form
Loss of Mechanical Function	Same as NUREG-1801 Table IX.E	Loss of Mechanical Function
Loss of Preload	Same as NUREG-1801 Table IX.E	Loss of Preload
Loss of Sealing	Same as NUREG-1801 Table IX.E	Loss of Sealing; Leakage Through Containment
Not Applicable	The aging effect in NUREG-1801 is determined not applicable to Oyster Creek material and environment combination. A basis for this determination is provided in a plant specific note.	
None	The material in the specified environment does not result in an aging effect requiring management.	None
Reduction in Anchor Capacity Due to Local Concrete Degradation	Same as NUREG-1801 Table IX.E	Reduction in Anchor Capacity Due to Local Concrete Degradation

Table 3.0-4 – Oyster Creek Aging Effects

Oyster Creek Aging Effects	Description or Explanation	Equivalent NUREG-1801 Aging Effects
Reduction of Heat Transfer	Same as NUREG-1801 Table IX.E	Reduction of Heat Transfer
Reduction of Neutron-Absorbing Capacity	Same as NUREG-1801 Table IX.E	Reduction of Neutron-Absorbing Capacity
Reduction or Loss of Isolation Function	Same as NUREG-1801 Table IX.E	Reduction or Loss of Isolation Function
Various degradation / various mechanisms	Same as NUREG-1801	Various degradation / various mechanisms

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEMS

3.1.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.1, Reactor vessel, Internals, and Reactor Coolant Systems (RCS), as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Isolation Condenser System (2.3.1.3)
- Nuclear Boiler Instrumentation System (2.3.1.4)
- Reactor Head Cooling System (2.3.1.5)
- Reactor Internals (2.3.1.6)
- Reactor Pressure Vessel (2.3.1.7)
- Reactor Recirculation System (2.3.1.8)

3.1.2 RESULTS

3.1.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Managements Programs For The Reactor Vessel, Internals, And Reactor Coolant System

3.1.2.1.1 Isolation Condenser System

Materials

The materials of construction for the Isolation Condenser System components are:

- Alloy Steel
- Carbon and low alloy steel
- Cast Austenitic Stainless Steel (CASS)
- Stainless Steel

Environments

The Isolation Condenser System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Outdoor Air
- Steam
- Treated Water
- Treated Water < 140F

Aging Effects Requiring Management

The following aging effects associated with the Isolation Condenser System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Isolation Condenser System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Bolting Integrity
- BWR Stress Corrosion Cracking
- One Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.1.2.1.1, Summary of Aging Management Evaluation – Isolation Condenser System summarizes the results of the aging management review for the Isolation Condenser System.

3.1.2.1.2 Nuclear Boiler Instrumentation System

Materials

The materials of construction for the Nuclear Boiler Instrumentation System components are:

- Alloy Steel
- Carbon and Low Alloy Steel
- Stainless Steel

Environments

The Nuclear Boiler Instrumentation System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Steam
- Treated Water
- Treated Water < 140F

Aging Effects Requiring Management

The following aging effects associated with the Nuclear Boiler Instrumentation System components require management:

- Cracking Initiation and Growth

- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Nuclear Boiler Instrumentation System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Bolting Integrity
- BWR Stress Corrosion Cracking
- One-Time Inspection
- Water Chemistry

Table 3.1.2.1.2, Summary of Aging Management Evaluation – Nuclear Boiler Instrumentation System summarizes the results of the aging management review for the Nuclear Boiler Instrumentation System.

3.1.2.1.3 Reactor Head Cooling System

Materials

The materials of construction for the Reactor Head Cooling System components are:

- Alloy Steel
- Carbon and Low Alloy Steel
- Cast Austenitic Stainless Steel (CASS)
- Stainless Steel

Environments

The Reactor Head Cooling System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Steam
- Treated Water
- Treated Water < 140F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Head Cooling components require management:

- Cumulative Fatigue Damage (TLAA)
- Cracking Initiation and Growth
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Head Cooling System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Bolting Integrity
- One Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.1.2.1.3, Summary of Aging Management Evaluation – Reactor Head Cooling System summarizes the results of the aging management review for the Reactor Head Cooling System.

3.1.2.1.4 <u>Reactor Internals</u>

Materials

The materials of construction for the Reactor Internal components are:

- Cast Austenitic Stainless Steel (CASS)
- Nickel Alloy
- Stainless Steel

Environments

The Reactor Internal components are exposed to the following environments:

- Containment Atmosphere
- Steam
- Treated Water
- Treated Water > 482F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Internals require management

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Fracture Toughness

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Internal components:

- BWR Vessel Internals
- Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)
- Water Chemistry

Table 3.1.2.1.4, Summary of Aging Management Evaluation – Reactor Internals summarizes the results of the aging management review for the Reactor Internals.

3.1.2.1.5 Reactor Pressure Vessel

Materials

The materials of construction for the Reactor Pressure Vessel components are:

- Carbon and Low Alloy Steel
- Carbon and Low Alloy Steel (with stainless cladding)
- High Strength Alloy Steel
- Nickel Alloy
- Stainless Steel

Environments

The Reactor Pressure Vessel components are exposed to the following environments:

- Containment Atmosphere
- Steam
- Treated Water
- Treated Water > 482F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Pressure Vessel require Management

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Fracture Toughness

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Pressure Vessel components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWC
- BWR Control Rod Drive Return Line Nozzle
- BWR Feedwater Nozzle
- Reactor Head Closure Studs
- BWR Penetrations
- BWR Stress Corrosion Cracking
- BWR Vessel ID Attachment Welds
- BWR Vessel Internals
- One Time Inspection
- Reactor Head Closure Studs
- Reactor Vessel Surveillance
- Water Chemistry

Table 3.1.2.1.5, Summary of Aging Management Evaluation – Reactor Pressure Vessel summarizes the results of the aging management review for the Reactor Pressure Vessel.

3.1.2.1.6 Reactor Recirculation System

Materials

The materials of construction for the Reactor Recirculation System components are:

- Alloy Steel
- Carbon and low alloy steel
- Cast Austenitic Stainless Steel (CASS)
- Glass
- Stainless steel

Environments

The Oyster Creek Reactor Recirculation System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Lubricating Oil
- Treated Water
- Treated Water < 140F
- Treated Water > 482F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Recirculation components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Recirculation System components:

- ASME Section XI Inservice Inspection, subsections IWB, IWC, and IWD
- Bolting Integrity
- BWR Stress Corrosion Cracking
- Lubricating Oil Monitoring
- One-Time Inspection Activities
- Structures Monitoring Program
- Water Chemistry

Table 3.1.2.1.6, Summary of Aging Management Evaluation – Reactor Recirculation System summarizes the results of the aging management review for the Reactor Recirculation System.

3.1.2.2 AMR Results Consistent with the GALL Report for Which Further Evaluation is Recommended

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the LRA. For the Reactor Vessel, Internals, and Reactor Coolant System, those programs are addressed in the following subsections.

3.1.2.2.1 Cumulative Fatigue Damage (BWR/PWR)

Fatigue is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of this TLAA is addressed separately in Section 4.3.

For Oyster Creek the evaluation of fatigue for the reactor vessel and the reactor internals is discussed in Sections 4.3.1 and 4.3.2, respectively. The evaluation of fatigue as a TLAA for the Class 1 portions of the reactor coolant boundary piping and components, including those for Core Spray System, Isolation Condenser, the Reactor Recirculation System, Shutdown Cooling System, Control Rod Drive, Feedwater, Main Steam, Post-Accident Sampling, Standby Liquid Control, Nuclear Boiler Instrumentation, Reactor Head Cooling System, and Reactor Water Cleanup Systems is discussed in Section 4.3.3.

3.1.2.2.2 Loss of Material due to General, Pitting, and Crevice Corrosion (BWR/PWR)

1. Loss of material due to general, pitting, and crevice corrosion in a steel PWR steam generator shell assembly (PWR)

   This is applicable to PWRs only.

2. Loss of material due to pitting and crevice corrosion could occur in stainless steel BWR isolation condenser components. General, pitting, and crevice corrosion could occur in steel BWR isolation condenser components. The existing program relies on control of reactor water chemistry to mitigate corrosion and on ASME Section XI inservice inspection (ISI). However, the existing program should be augmented to detect loss of material due to general, pitting or crevice corrosion. The GALL report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water, and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will use the Water Chemistry program, B.1.2, to manage aging of stainless steel tube side components of the Isolation Condenser System exposed to reactor coolant. The program activities provide for monitoring and controlling of water chemistry using station procedures and processes for the prevention or mitigation of loss of material aging effects. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used with the Water Chemistry program to manage loss of material. The ASME Section XI Inservice

Inspection program will be enhanced to perform inspection of the isolation condenser tube side components, including temperature and radioactivity monitoring of the shell-side water, eddy current testing of the tubes, and inspection (VT or UT) of the tubesheet and channel head to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program are described in Appendix B.

3.1.2.2.3 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement (BWR/PWR)

1. Neutron irradiation embrittlement is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence greater than 10^{17} n/cm2 (E >1 MeV) at the end of the license renewal term. Certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). The evaluation of this TLAA is addressed separately in Section 4.2.

   For Oyster Creek the effects of increased neutron fluence on the fracture toughness of the reactor vessel beltline plates and welds is discussed in Section 4.2. Also discussed in 4.2 is the impact on the vessel's temperature- pressure curves and weld exam requirements.

2. Loss of fracture toughness due to neutron irradiation embrittlement could occur in BWR and PWR reactor vessels. A reactor vessel materials surveillance program monitors neutron irradiation embrittlement of the reactor vessel. Reactor vessel surveillance programs are plant specific, depending on matters such as the composition of limiting materials, availability of surveillance capsules, and projected fluence levels. In accordance with 10 CFR Part 50, Appendix H, an applicant is required to submit its proposed withdrawal schedule for approval prior to implementation. Thus, further staff evaluation is required for license renewal.

   The Oyster Creek Reactor Vessel Surveillance program, B.1.23, is based the BWR Integrated Surveillance Program (ISP) and satisfies the requirements of 10 CFR 50, Appendix H. The reactor vessel surveillance aging management program includes periodic testing of metallurgical surveillance samples to monitor the progress of neutron embrittlement of the reactor pressure vessel as a function of neutron fluence, in accordance with Regulatory Guide (RG) 1.99, “Radiation Embrittlement of Reactor Vessel Materials," Revision 2. BWRVIP-116 identifies and schedules additional capsules to be withdrawn and tested during the license renewal period. Oyster Creek will continue to participate in using the Integrated Surveillance Program during the period of extended operation by implementing the requirements of BWRVIP-116, and by addressing any additional actions required by the associated NRC Safety Evaluation with BWRVIP-116, once it is approved. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Reactor Vessel Surveillance program is described in Appendix B.

3. Loss of fracture toughness due to neutron irradiation embrittlement in Westinghouse and B&W baffle/former bolts and screws (PWR).

   This is applicable to PWRs only.

3.1.2.2.4 Cracking due to Stress Corrosion Cracking and Intergranular Stress Corrosion Cracking (BWR)

1. Cracking due to stress corrosion cracking (SCC) and intergranular stress corrosion cracking [IGSCC]) could occur in small-bore steel and stainless steel reactor coolant system and connected system piping less than Nominal Pipe Size (NPS) 4. The existing program relies on ASME Section XI ISI and on control of water chemistry to mitigate SCC. The GALL report recommends that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the period of extended operation. The AMPs should be augmented by verifying that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipe, fittings, and branch connections.

   Stress corrosion cracking (SCC) and intergranular stress corrosion cracking (IGSCC) of carbon and low alloy steels are not considered applicable aging mechanisms in steam or treated water environments. This is in accordance with EPRI Mechanical Tools Appendix A.

   Oyster Creek will use the Water Chemistry program, B.1.2, to mitigate aging due to stress corrosion cracking and intergranular stress corrosion cracking of stainless steel piping, piping components, fittings and branch connection components exposed to reactor coolant within the RCPB, including those components in Core Spray, the Reactor Recirculation, Shutdown Cooling, Control Rod Drive, Feedwater, Main Steam, Standby Liquid Control, Nuclear Boiler Instrumentation, Reactor Head Cooling System, Reactor Water Cleanup, Post-Accident Sampling, and Isolation Condenser Systems. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used with the Water Chemistry Program to manage the effects of stress corrosion cracking. Oyster Creek will also use The One-Time Inspection program, B.1.24, to verify that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipe, fittings, and branch connections. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD programs will also be used for Class 1 stainless steel pipe, piping components, fittings, and branch connections that are greater than or equal to NPS 4 to verify stress corrosion cracking is not occurring and to ensure the component intended function will be maintained during the extended period of operation.

Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry program, The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program and the One-Time Inspection program are described in Appendix B.

2. Cracking due to SCC and IGSCC could occur in the stainless steel and nickel alloy BWR reactor vessel flange leak detection lines. The GALL report recommends that a plant-specific aging management program be evaluated because existing programs may not be capable of mitigating or detecting cracking due to SCC.

   Oyster Creek will use the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, to ensure the reactor vessel flange leak detection lines are not experiencing aging effects caused by SCC and IGSCC. The Oyster Creek ISI Program utilizes a VT-2 visual examination on the line prior to reactor cavity drain down during each refueling outage. This examination will be credited for managing cracking. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is described in Appendix B.

3. Cracking due to SCC and IGSCC could occur in steel and stainless steel BWR isolation condenser components. The existing program relies on control of reactor water chemistry to mitigate SCC and on ASME Section XI inservice inspection (ISI). However, the existing program should be augmented to detect cracking due to SCC and cyclic loading or loss of material due to pitting and crevice corrosion. The GALL report recommends an augmented program to include temperature and radioactivity monitoring of the shell-side water, and eddy current testing of tubes to ensure that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will use the Water Chemistry program, B.1.2, to manage aging of stainless steel tube side components of the Isolation Condenser System exposed to reactor coolant. The program activities provide for monitoring and controlling of water chemistry using station procedures and processes for the prevention or mitigation of cracking due stress corrosion cracking and IGSCC. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used with the Water Chemistry Program to manage the aging effects of stress corrosion cracking and IGSCC. The ASME Section XI Inservice Inspection Program will be enhanced to perform inspection of the isolation condenser tube side components, including temperature and radioactivity monitoring of the shell-side water, eddy current testing of the tubes, and inspection (VT or UT) of the tubesheet and channel head to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation.

Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program are described in Appendix B.

3.1.2.2.5 Crack Growth due to Cyclic Loading (PWR)

This is applicable to PWRs only.

3.1.2.2.6 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement and Void Swelling (PWR)

This is applicable to PWRs only.

3.1.2.2.7 Cracking due to Stress Corrosion Cracking (PWR)

This is applicable to PWRs only.

3.1.2.2.8 Cracking due to Cyclic Loading (BWR)

Cracking due to cyclic loading could occur in the stainless steel BWR jet pump sensing lines. The GALL report recommends that a plant specific aging management program be evaluated to mitigate or detect cracking due to line

This item is not applicable to Oyster Creek. Oyster Creek does not have jet pumps or jet pump sensing lines.

3.1.2.2.9 Loss of Preload due to Stress Relaxation (PWR)

This is applicable to PWRs only.

3.1.2.2.10 Loss of Material due to Erosion (PWR)

This is applicable to PWRs only.

3.1.2.2.11 Cracking due to Flow-Induced Vibration (BWR)

Cracking due to flow-induced vibration could occur for the BWR stainless steel steam dryers. The GALL report recommends further evaluation of a plant-specific aging management program to ensure that this aging effect is adequately managed.

Oyster Creek will use the Reactor Internals program, B.1.9, to manage to the effects of cracking of the steam dryer. Oyster Creek will implement the guidelines of BWRVIP-135 for the steam dryer when issued. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Reactor Internals program is described in Appendix B.

3.1.2.2.12 Cracking due to Thermal and Mechanical Loading (BWR/PWR)

Cracking due to thermal and mechanical loading could occur in Class 1 small-bore steel (BWR), steel with stainless steel cladding, and stainless steel reactor coolant system and connected system piping less than NPS 4. The existing program relies on ASME Section XI ISI to manage cracking due to thermal and mechanical loading. However, Inservice Inspection for Class 1 components Inspection in accordance with ASME Section XI does not require volumetric examination of pipes less than NPS 4. Therefore, a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period of operation. A one-time inspection of a sample of locations is an acceptable method to ensure that the aging effect is not occurring and the component's intended function will be maintained during the period of extended operation.

Oyster Creek will use the ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1 to mitigate cracking due to thermal and mechanical loading of steel and stainless steel piping, piping components, fittings and branch connections exposed to reactor coolant within the RCPB, including those components in Core Spray, the Reactor Recirculation, Shutdown Cooling, Control Rod Drive, Feedwater, Main Steam, Standby Liquid Control, Nuclear Boiler Instrumentation, Post-Accident Sampling System, Reactor Head Cooling System, Reactor Water Cleanup, and Isolation Condenser Systems. Oyster Creek will also use The One-Time Inspection program, B.1.24, to verify that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipe, fittings, and branch connections. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD programs will also be used for Class 1 steel pipe, fittings, and branch connections that are greater than or equal to NPS 4 to verify stress corrosion cracking is not occurring and to ensure the component intended function will be maintained during the extended period of operation.

Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program and the One-Time Inspection program are described in Appendix B.

3.1.2.2.13 Cracking due to Primary Water Stress Corrosion Cracking (PWR)

This is applicable to PWRs only.

3.1.2.2.14 Wall Thinning due to Flow-accelerated Corrosion (PWR)

This is applicable to PWRs only.

3.1.2.2.15 Changes in Dimensions due to Void Swelling (PWR)

This is applicable to PWRs only.

3.1.2.2.16 Cracking Due to Stress Corrosion Cracking and Primary Water Stress Corrosion Cracking PWR)

This is applicable to PWRs only.

3.1.2.2.17 Cracking due to Stress Corrosion Cracking, Primary Water Stress Corrosion Cracking, and Irradiation-Assisted Stress Corrosion Cracking (PWR)

This is applicable to PWRs only.

3.1.2.2.18 Cracking due to Stress Corrosion Cracking and Irradiation-Assisted Stress Corrosion Cracking (PWR)

This is applicable to PWRs only.

3.1.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Reactor Vessel, Internals and Reactor Coolant System components:

- Section 4.2, Neutron Embrittlement of the Reactor Vessel and Internals
- Section 4.3, Metal Fatigue Analysis

3.1.3 CONCLUSION

The Reactor Vessel, Internals, and Reactor Coolant System piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Reactor Vessel, Internals, and Reactor Coolant System components are identified in the summaries in Section 3.1.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Reactor Vessel, Internals, and Reactor Coolant System components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-1	Reactor coolant pressure boundary closure bolting, head closure studs, support skirts and attachment welds, pressurizer relief tank components, steam generator components, and reactor vessel internals	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-2	Reactor coolant pressure boundary components, steam generator tubes and sleeves, reactor vessel internals, pressurizer components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	(Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-3	Pump and valve closure bolting	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) check Code limits for allowable cycles (less than 7000 cycles) of thermal stress range	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.1.2.2.1.
3.1.1-4	PWR Only				

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-5	Stainless steel; steel isolation condenser tube side components exposed to reactor coolant	Loss of material due to general (steel only), pitting and crevice corrosion	Inservice inspection, water chemistry, and plant-specific verification program	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1will be used with the Water Chemistry program, B.1.2, to manage the loss of material in the stainless steel tube side component of the isolation condensers. The ASME Section XI Inservice Inspection program will be enhanced to included inspections recommended in NUREG-1801. Exceptions apply to the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD and Water Chemistry program implementation. See subsection 3.1.2.2.2.2
3.1.1-6	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	Consistent with NUREG-1801. Loss of Fracture Toughness for the reactor vessel beltline shell, and welds is addressed as a TLAA in section 4.2. See subsection 3.1.2.2.3.1

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-7	Reactor vessel beltline shell, nozzles, and welds; safety injection nozzles	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Yes, plant specific	Consistent with NUREG-1801.The loss of fracture toughness due to neutron irradiation embrittlement of the Reactor vessel beltline shell, and welds will be managed by Reactor Vessel Surveillance program, B.1.23. (See subsection 3.1.2.2.3.2)
3.1.1-8	PWR Only				
3.1.1-9	Steel and stainless steel Class 1 piping, fittings and branch connections < NPS 4 exposed to reactor coolant	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	Inservice Inspection, Water chemistry, and a plant specific examination	Yes, parameters monitored/inspected and detection of aging effects are to be evaluated	The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1will be used with the Water Chemistry program, B.1.2, to manage the stress corrosion cracking Steel and stainless steel Class 1 piping, fittings exposed to reactor coolant. The One-Time Inspection program, B.1.24, will be used to verify that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipe, fittings, and branch connections as recommended in NUREG-01. See subsection 3.1.2.2.4.1

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-10	Stainless steel and nickel alloy reactor vessel flange leak detection line	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	A plant-specific aging management program is to be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC in the vessel flange leak detection line.	Yes, plant specific	The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used to manage the effects of stress corrosion cracking in the stainless steel vessel flange leak detection line. See subsection 3.1.2.2.4.2
3.1.1-11	Stainless steel; steel isolation condenser tube side components exposed to reactor coolant	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	Inservice inspection, water chemistry, and plant-specific verification program	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1will be used with the Water Chemistry program, B.1.2, to manage the cracking in the stainless steel tube side component of the isolation condensers. The ASME Section XI Inservice Inspection program will be enhanced to include inspections recommended in NUREG-1801. Exceptions apply to the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD and Water Chemistry program implementation. See subsection 3.1.2.2.4.3
3.1.1-12	PWR Only				

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-13	PWR Only				
3.1.1-14	PWR Only				
3.1.1-15	PWR Only				
3.1.1-16	PWR Only				
3.1.1-17	Stainless steel jet pump sensing line	Cracking due to cyclic loading	Plant specific	Yes, plant specific	Not Applicable. Oyster Creek does not have jet pumps or jet pump sensing lines. (See subsection 3.1.2.2.8)
3.1.1-18	PWR Only				
3.1.1-19	PWR Only				
3.1.1-20	Stainless steel steam dryers exposed to reactor coolant	Cracking due to flow-induced vibration	Plant specific	Yes, plant specific	Oyster Creek will use the Reactor Internals program, B.1.9, to manage to the effects of cracking of the steam dryer. Oyster Creek will implement the guidelines of BWRVIP-135 for the steam dryer when issued. See subsection 3.1.2.2.11

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-21	BWR steel and stainless steel Class 1 piping, fittings and branch connections < NPS 4 exposed to reactor coolant; PWR stainless steel and steel with stainless steel cladding Class 1 piping, fittings and branch connections < NPS 4	Cracking due to thermal and mechanical loading	Inservice Inspection and a plant specific examination (one-time inspection)	Yes, parameters monitored/inspected and detection of aging effects are to be evaluated	The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used to manage Cracking due to thermal and mechanical loading of Class 1 steel and stainless steel piping, piping components, and fittings exposed to reactor coolant. In addition the One-Time Inspection will also be used to verify that service induced weld cracking is not occurring in small bore piping less than NPS 4. See subsection 3.1.2.2.12
3.1.1-22	PWR Only				
3.1.1-23	PWR Only				
3.1.1-24	PWR Only				
3.1.1-25	PWR Only				
3.1.1-26	PWR Only				
3.1.1-27	PWR Only				
3.1.1-28	PWR Only				
3.1.1-29	PWR Only				

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-30	PWR Only				
3.1.1-31	Stainless steel and nickel alloy penetrations for control rod drive stub tubes instrumentation, jet pump instrument, standby liquid control, flux monitor, and drain line exposed to reactor coolant	Cracking due to stress corrosion cracking, Intergranular stress corrosion cracking, cyclic loading	BWR penetrations and water chemistry	No	The Water Chemistry program, B.1.2, to manage stress corrosion cracking in the nickel alloy Standby Liquid Control and Incore Instrumentation penetrations exposed to reactor coolant. Inspections performed as part of the BWR Vessel Penetration Program, B.1.8, will be used to verify the effectiveness of the Water Chemistry program. The stainless steel control rod stubs and incore flux monitoring housings are managed by the BWR Reactor Internals program, B.1.9, evaluated in item 3.1.1-35.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-32	Stainless steel, cast austenitic stainless steel, and nickel alloy piping, piping components, and piping elements greater than or equal to 4 NPS; nozzle safe ends and associated welds	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	BWR Stress Corrosion Cracking and Water Chemistry	No	The Water Chemistry program, B.1.2, and the BWR Stress Corrosion Cracking program, B.1.7, will be used to manage stress corrosion cracking of stainless steel and cast austenitic stainless steel components greater than 4 NPS, including the reactor vessel safe ends and associated welds. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used in addition to the Water Chemistry and BWR Stress Corrosion Cracking programs to manage cracking due to stress corrosion cracking and intergranular stress corrosion cracking. Cracking in CRD Return Line nozzle and Feedwater nozzle thermal sleeves is managed by the CRD Nozzle, B.1.6, and the Feedwater Nozzle, B.1.5, programs in conjunction with the Water Chemistry program.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-33	Stainless steel, nickel alloy vessel shell attachment welds exposed to reactor coolant	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	BWR vessel ID attachment welds and water chemistry	No	Consistent with NUREG-1801, with exceptions. The Water Chemistry program, B.1.2, and the Attachment Welds program, B.1.4, will be used to manage stress corrosion cracking in the nickel alloy vessel shell attachment welds exposed to reactor coolant. The program activities provide for monitoring and controlling of water chemistry for the prevention or mitigation of aging effects. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry and BWR Vessel ID Attachment Welds program implementation.
3.1.1-34	Stainless steel fuel supports and control rod drive assemblies control rod drive housing exposed to reactor coolant	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	BWR vessel internals and water chemistry	No	Consistent with NUREG-1801, with exceptions. The Water Chemistry program, B.1.2, and the BWR Reactor Internals program, B.1.9, will be used to manage stress corrosion cracking in the stainless steel control rod drive housings and fuel supports exposed to reactor coolant. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry program implementation.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-35	Stainless steel, cast austenitic stainless steel, nickel alloy core shroud, core plate, core plate bolts, support structure, top guide, core spray lines, spargers, jet pump assemblies, control rod drive housing, nuclear instrumentation guide tubes	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	BWR vessel internals and water chemistry	No	Consistent with NUREG-1801, with exceptions. The Water Chemistry program, B.1.2, used to manage cracking due to stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking in the stainless steel core shroud, core plate, core plate bolts, support structure, top guide, core spray lines and sparger, control rod drive housing, nuclear instrumentation guide tubes, and repair hardware exposed to reactor coolant. Inspections performed as part of the BWR Reactor Internals program, B.1.9, will be used to verify the effectiveness of the Water Chemistry program. Exceptions apply to the NUREG-1801 recommendations for the Water Chemistry and BWR Reactor Internals program implementation.
3.1.1-36	Steel (with or without stainless steel cladding) control rod drive return line nozzles exposed to reactor coolant	Cracking due to cyclic loading	CRD return line nozzle	No	Consistent with NUREG-1801with exceptions. The BWR Control Rod Drive Return Line Nozzle program, B.1.6, will be used to manage cracking due to cyclic loading of the CRD return line nozzle. Exceptions apply to the NUREG-1801 recommendations for the BWR Control Rod Drive Return Line program implementation.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-37	Steel (with or without stainless steel cladding) feedwater nozzles exposed to reactor coolant	Cracking due to cyclic loading	Feedwater nozzle	No	Consistent with NUREG-1801 with exceptions. The BWR Feedwater Nozzle program, B.1.5, will be used to manage cracking due to cyclic loading of the feedwater nozzle. Exceptions apply to the NUREG-1801 recommendations for the BWR Feedwater Nozzle program implementation.
3.1.1-38	Steel piping, piping components, and piping elements exposed to reactor coolant	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	No	Consistent with NUREG-1801. The Flow-Accelerated Corrosion program, B.1.11, will be used to manage wall thinning due to flow-accelerated corrosion on Steel piping, piping components, and piping elements exposed to reactor coolant. This includes piping and piping components in the Main Steam and Feedwater systems.
3.1.1-39	Nickel alloy core shroud and core plate access hole cover (welded and mechanical covers)	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Inservice inspection and water chemistry	No	This line item is not used for Oyster Creek because Oyster Creek does not have access holes or hole covers in the shroud support plate.
3.1.1-40	Steel top head enclosure (without cladding) top head nozzles (vent, top head spray or RCIC, and spare) exposed to reactor coolant	Loss of material due to general, pitting and crevice corrosion	Inservice inspection and water chemistry	No	The Oyster Creek top head enclosure is clad with stainless steel and not subject to loss of material from general, pitting and crevice corrosion. No aging program is required.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-41	Nickel alloy core shroud and core plate access hole cover (welded and mechanical covers)	Cracking due to stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Inservice inspection, water chemistry, and augmented inspection of the access hole cover welds	No	This line item is not used for Oyster Creek, because Oyster Creek does not have access holes or hole covers in the shroud support plate.
3.1.1-42	High-strength low alloy steel top head closure studs and nuts exposed to air with reactor coolant leakage	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	Reactor head closure studs	No	Consistent with NUREG-1801 with exceptions. The Reactor Head Closure Studs program, B.1.3, will be used to manage cracking in the high-strength low alloy steel top head closure studs due to Stress corrosion cracking and intergranular stress corrosion cracking. Exceptions apply to the NUREG-1801 recommendations for the Reactor Head Closure Studs program implementation.
3.1.1-43	Jet pump assembly castings; orificed fuel support	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal aging and neutron irradiation embrittlement	No	Consistent with NUREG-1801. The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) program, B.1.10 will be used to manage loss of fracture toughness due to thermal aging and neutron irradiation embrittlement for fuel support assemblies, control rod guide tube base castings, and the core spray nozzle elbows. The components are constructed of CASS and are exposed to reactor coolant and high neutron flux. This line item is not applied to jet pumps because Oyster Creek does not have jet pumps.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-44	Reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding 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 stress relaxation	Bolting Integrity	No	Consistent with NUREG-1801 with exceptions. The Bolting Integrity program, B.1.12, will be used to manage loss of material due to wear and loss of preload due to stress relaxation for bolting used on closure bolting for components in the RCPB. Exceptions apply to the NUREG-1801 recommendations for the Bolting Integrity program implementation.
3.1.1-45	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 and One-Time Inspection	No	Not Applicable. Oyster Creek has no copper alloy piping, piping components, or piping elements exposed to a closed cycle cooling water environment in the Reactor Vessel, Internals, or Reactor Coolant System.
3.1.1-46	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 and One-Time Inspection	No	Not Applicable. Oyster Creek has no stainless steel piping, piping components, or piping elements exposed to a closed cycle cooling water environment in the Reactor Vessel, Internals, or Reactor Coolant System.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-47	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. Thermal aging susceptibility screening is not necessary, inservice inspection requirements are sufficient for managing these aging effects. ASME Code Case N-481 also provides an alternative for pump casings.	No	Consistent with NUREG-1801 with exceptions. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used to manage loss of fracture toughness due to thermal aging embrittlement in Class 1 pump casing and valve bodies exposed to exposed to reactor coolant >482F. This line item applies to components in the Reactor Recirculation, Reactor Water cleanup, and Isolation Condenser systems. Exceptions apply to the NUREG-1801 recommendations for the ASME Section XI Inservice Inspection program implementation.
3.1.1-48	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Not Applicable. Oyster Creek has no copper alloy >15% Zn piping, piping components, or piping elements exposed to a closed cycle cooling water environment in the Reactor Vessel, Internals, or Reactor Coolant System.
3.1.1-49	Cast austenitic stainless steel piping and CRD pressure housings	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	Not applicable. Oyster Creek does not have cast austenitic stainless steel piping that is subject to loss of fracture toughness due to thermal aging embrittlement. Aging of the core spray sparger spray nozzle is evaluated in line item 3.1.1-43.
3.1.1-50	PWR only				
3.1.1-51	PWR only				

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-52	PWR only				
3.1.1-53	PWR only				
3.1.1-54	PWR only				
3.1.1-55	PWR only				
3.1.1-56	PWR only				
3.1.1-57	PWR only				
3.1.1-58	PWR only				
3.1.1-59	PWR only				
3.1.1-60	PWR only				
3.1.1-61	PWR Only				
3.1.1-62	PWR Only				
3.1.1-63	PWR Only				

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-64	PWR Only				
3.1.1-65	PWR Only				
3.1.1-66	PWR Only				
3.1.1-67	PWR Only				
3.1.1-68	PWR Only				
3.1.1-69	PWR Only				
3.1.1-70	Stainless steel piping, piping components, and piping elements exposed to air with borated water leakage or gas	None	None	NA - No AEM or AMP	Not Applicable. Oyster Creek has no steel or stainless steel piping, piping components, or piping elements exposed to air with borated water leakage or gas.
3.1.1-71	Stainless steel, cast austenitic 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.
3.1.1-72	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Not Applicable. Oyster Creek has no steel or stainless steel piping, piping components, or piping elements in concrete in the RCPB.

Table 3.1.1 Summary of Aging Management Evaluations for the Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-73	PWR Only				

Table 3.1.2.1.1
Isolation Condenser System
Summary of Aging Management Evaluation

Table 3.1.2.1.1 Isolation Condenser System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Filter	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-8 (E-45)	3.2.1-2	E
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						V.E-5 (EP-24)	3.2.1-25	B, 10
		Carbon and low alloy steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						V.E-5 (EP-24)	3.2.1-25	B, 10
		Stainless Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C2-11 (R-18)	3.1.1-1	A, 3
				Loss Of Preload	Bolting Integrity (B.1.12)			G
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C2-11 (R-18)	3.1.1-1	A, 3
				Loss Of Preload	Bolting Integrity (B.1.12)			G
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (isolation condensers)	Heat Transfer	Stainless Steel (Tubes)	Treated Water (Internal)	Reduction of Heat Transfer	Water Chemistry (B.1.2)	V.D2-10 (EP-34)	3.2.1-24	B
			Treated Water < 140F (External)	Reduction of Heat Transfer	Water Chemistry (B.1.2)	V.D2-10 (EP-34)	3.2.1-24	B
	Pressure Boundary	Carbon and low alloy steel (Shell Side Components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Indoor Air (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-13 (E-29)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-3 (S-18)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-3 (S-18)	3.4.1-2	B
		Stainless Steel (Tube Side Components)	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	C, 9
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-5 (R-15)	3.1.1-11	B, 8

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (isolation condensers)	Pressure Boundary	Stainless Steel (Tubes and Tube Side Components)	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-5 (R-15)	3.1.1-11	B, 8
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	C, 8
				Loss of Material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-6 (R-16)	3.1.1-5	B, 8
					Water Chemistry (B.1.2)	IV.C1-6 (R-16)	3.1.1-5	B, 8
			Treated Water < 140F (External)	Loss of Material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	V.D2-23 (EP-32)	3.2.1-3	E, 1
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Indoor Air (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-13 (E-29)	3.2.1-2	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-8 (E-45)	3.2.1-2	E
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	V.D2-26 (E-10)	3.2.1-1	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B, 11
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 4
						IV.C1-2 (R-55)	3.1.1-21	B, 4
						IV.C1-9 (R-22)	3.1.1-32	E, 4, 6
					BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B, 4
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A, 4
						IV.C1-2 (R-55)	3.1.1-21	A, 4
						VIII.B2-1 (SP-45)	3.4.1-8	A, 4
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B, 4

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-9 (R-22)	3.1.1-32	B, 4
						VIII.B2-1 (SP-45)	3.4.1-8	B, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 4
						V.D2-22 (E-16)	3.2.1-1	A, 4
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 4
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 4
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B
						IV.C1-9 (R-22)	3.1.1-32	E, 6

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
						VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-9 (R-22)	3.1.1-32	B
						VIII.E-25 (SP-19)	3.4.1-8	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
						V.D2-22 (E-16)	3.2.1-1	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Thermowell	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
		Stainless Steel	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 2, 7
						IV.C1-2 (R-55)	3.1.1-21	E, 2, 7
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 2, 7
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
		Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	CASS	Containment Atmosphere (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Steam (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-10 (R-20)	3.1.1-32	B, 4
					Water Chemistry (B.1.2)	IV.C1-10 (R-20)	3.1.1-32	B, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 4
				Loss of Fracture Toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-4 (R-08)	3.1.1-47	B, 4
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 4, 5
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 4, 5
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-10 (R-20)	3.1.1-32	B
					Water Chemistry (B.1.2)	IV.C1-10 (R-20)	3.1.1-32	B

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	CASS	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 5
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 5
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Steam (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B, 4
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 2, 4, 7
						IV.C1-2 (R-55)	3.1.1-21	E, 2, 4, 7
						VIII.B2-1 (SP-45)	3.4.1-8	A, 4
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 2, 4, 7

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-9 (R-22)	3.1.1-32	B, 4
						VIII.B2-1 (SP-45)	3.4.1-8	B, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 4
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 4
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 4
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 2, 7
						IV.C1-2 (R-55)	3.1.1-21	E, 2, 7
						VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 2, 7

Table 3.1.2.1.1 Isolation Condenser System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-9 (R-22)	3.1.1-32	B
						VIII.E-25 (SP-19)	3.4.1-8	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. This Aging Effect for the isolation condenser is addressed by the Aging Management Program, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD", as enhanced by the inspection and verification requirements from NUREG-1801.
2. ASME XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to cracking of these items.
3. Cumulative Fatigue Damage (TLAA) is not included in NUREG-1801 as an aging effect for stainless steel bolting in BWRs. The bolting fatigue issue is addressed by TLAA, evaluated in accordance with 10CFR54.21(c).
4. The environment of steam is considered similar to the environments of reactor coolant or treated water for evaluation of this component and material, consistent with the environment definitions in NUREG-1801 Chapter IX.
5. CASS material for this item is a subset of "Stainless Steel" for this Aging Effect.
6. The program for ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD is applied in addition to the NUREG-1801 specified programs for this item.
7. The applicable Aging Management Programs recommended in NUREG-1801 for Class 1 carbon and stainless steel piping, fittings, and branch connections < 4 in. NPS are also specified here for Class 1 valve bodies and other components < 4 in. NPS.
8. The reactor coolant environment of Treated Water (Internal) applies to the isolation condenser tube side piping, including supply and return piping, as this loop is connected to reactor coolant pressure boundary piping.

9. Indoor Air (External) environment applies to the isolation condenser tube side channel head.
10. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item EP-24 has been applied to the loss of preload aging effect for RCPB closure bolting.
11. Line item IV.C1-7 (R-23) for flow-accelerated corrosion is not an applicable aging mechanism as this is a standby system.

Table 3.1.2.1.2
Nuclear Boiler Instrumentation
Summary of Aging Management Evaluation

Table 3.1.2.1.2 Nuclear Boiler Instrumentation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						V.E-5 (EP-24)	3.2.1-25	B, 4

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
					Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
					Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
		Stainless Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C2-11 (R-18)	3.1.1-1	A
				Loss Of Preload	Bolting Integrity (B.1.12)			G

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Stainless Steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C2-11 (R-18)	3.1.1-1	A
				Loss Of Preload	Bolting Integrity (B.1.12)			G
Condensing chamber	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A, 3
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 2, 3, 5, 8
						IV.C1-2 (R-55)	3.1.1-21	B, 2, 3, 5, 8
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A, 2, 3, 5
						IV.C1-2 (R-55)	3.1.1-21	A, 2, 3, 5
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B, 2, 3, 5
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 2, 3

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Condensing chamber	Pressure Boundary	Stainless Steel	Steam (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 2, 3
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 3, 5, 8
						IV.C1-2 (R-55)	3.1.1-21	B, 3, 5, 8
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A, 3, 5
						IV.C1-2 (R-55)	3.1.1-21	A, 3, 5
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B, 3, 5
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 3
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 3
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 3

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Piping and fittings	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 2

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B, 2
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A, 2
						IV.C1-2 (R-55)	3.1.1-21	A, 2
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 2
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 2
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 2
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.A1-9 (R-61)	3.1.1-10	E, 7
						IV.C1-1 (R-03)	3.1.1-9	B

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B
						IV.C1-9 (R-22)	3.1.1-32	E, 1
					BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Valve Body	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.A1-9 (R-61)	3.1.1-10	E, 7
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 6, 9
						IV.C1-2 (R-55)	3.1.1-21	E, 6, 9
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 6, 9

Table 3.1.2.1.2 Nuclear Boiler Instrumentation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The program for ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD is applied in addition to the NUREG-1801 specified programs for this item.
2. The environment of steam is considered similar to the environments of reactor coolant or treated water for evaluation of this component and material, consistent with the environment definitions in NUREG-1801 Chapter IX.
3. Temperature Equalizing Columns RE08A and RE08B are included in the Condensing Chamber component type category.
4. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
5. The Aging Management Programs recommended in NUREG-1801 for Class 1 stainless steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 condensing chambers < 4 in. N.P.S.
6. The applicable Aging Management Programs recommended in NUREG-1801 for Class 1 stainless steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 valve bodies < 4 in. N.P.S.
7. The Reactor Pressure Vessel flange leak detection line is visually inspected per the ISI program each refueling outage.
8. ASME XI Inservice Inspection, Subsections IWB, IWC, and IWD applies to this item which is comprised of piping < 4 in. N.P.S.
9. ASME XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to cracking of valves.

Table 3.1.2.1.3
Reactor Head Cooling System
Summary of Aging Management Evaluation

Table 3.1.2.1.3 Reactor Head Cooling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
						VII.I-5 (AP-26)	3.3.1-35	B

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
						VII.I-5 (AP-26)	3.3.1-35	B
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 1

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B, 1
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A, 1
						IV.C1-2 (R-55)	3.1.1-21	A, 1
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B, 1
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 1
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 1
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 1
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Restricting Orifice	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 1, 4, 5
						IV.C1-2 (R-55)	3.1.1-21	E, 1, 4, 5
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 1, 4, 5

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Restricting Orifice	Pressure Boundary	Stainless Steel	Steam (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 1
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 1
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 1
	Throttle	Stainless Steel	Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 1, 4, 5
						IV.C1-2 (R-55)	3.1.1-21	E, 1, 4, 5
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 1, 4, 5
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 1
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 1
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 1
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 4, 5
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 3, 4
		CASS	Indoor Air (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 5
						IV.C1-2 (R-55)	3.1.1-21	E, 4, 5
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 5
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 5

Table 3.1.2.1.3 Reactor Head Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 4, 5
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 5
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The environment of steam is considered similar to the environments of reactor coolant or treated water for evaluation of this component and material, consistent with the environment definitions in NUREG-1801 Chapter IX.
2. NUREG-1801 line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
3. SCC and IGSCC of carbon and low alloy steel are not considered applicable aging mechanisms in a treated water environment per EPRI Mechanical Tools Appendix A.
4. The applicable programs for the aging effect of cracking as identified in line items IV.C1-1 (R-03) and IV.C1-2 (R-55) for class 1 piping, fittings and branch connections < NPS 4 have been applied to Class 1 components < NPS 4.
5. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to this component.

Table 3.1.2.1.4
Reactor Internals
Summary of Aging Management Evaluation

Table 3.1.2.1.4 Reactor Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Control Rod Drive Assembly (Housing and Guide Tube)	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-8 (R-104)	3.1.1-34	B
					Water Chemistry (B.1.2)	IV.B1-8 (R-104)	3.1.1-34	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
	Structural Support	CASS	Treated Water >482F (Internal)	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-8 (R-104)	3.1.1-34	B, 8
					Water Chemistry (B.1.2)	IV.B1-8 (R-104)	3.1.1-34	B, 8
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Control Rod Drive Assembly (Housing and Guide Tube)	Structural Support	CASS	Treated Water >482F (Internal)	Loss of Fracture Toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.1.10)	IV.B1-9 (R-103)	3.1.1-43	C
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-8 (R-104)	3.1.1-34	B
					Water Chemistry (B.1.2)	IV.B1-8 (R-104)	3.1.1-34	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Core Plate (Lower Core Grid)	Structural Support	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-6 (R-93)	3.1.1-35	B
					Water Chemistry (B.1.2)	IV.B1-6 (R-93)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Core Plate (Lower Core Grid) Wedges	Structural Support	Nickel Alloy	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-2 (R-96)	3.1.1-35	D, 2

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core Plate (Lower Core Grid) Wedges	Structural Support	Nickel Alloy	Treated Water	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.B1-2 (R-96)	3.1.1-35	D, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Core Shroud	Pressure Boundary	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-1 (R-92)	3.1.1-35	B
					Water Chemistry (B.1.2)	IV.B1-1 (R-92)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
	Structural Support	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-1 (R-92)	3.1.1-35	B
					Water Chemistry (B.1.2)	IV.B1-1 (R-92)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Core Spray Line Spray Nozzle Elbows	Pressure Boundary	CASS	Treated Water >482F	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-7 (R-99)	3.1.1-35	B, 8
					Water Chemistry (B.1.2)	IV.B1-7 (R-99)	3.1.1-35	B, 8

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core Spray Line Spray Nozzle Elbows	Pressure Boundary	CASS	Treated Water >482F	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
				Loss of Fracture Toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.1.10)	IV.B1-9 (R-103)	3.1.1-43	C
Core Spray Lines, Thermal Sleeves, Spray Rings (Sparger), and Spray Nozzles	Pressure Boundary	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-7 (R-99)	3.1.1-35	B
					Water Chemistry (B.1.2)	IV.B1-7 (R-99)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
	Spray	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-7 (R-99)	3.1.1-35	B

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core Spray Lines, Thermal Sleeves, Spray Rings (Sparger), and Spray Nozzles	Spray	Stainless Steel	Treated Water	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.B1-7 (R-99)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
	Structural Support	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-7 (R-99)	3.1.1-35	B
					Water Chemistry (B.1.2)	IV.B1-7 (R-99)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Core Spray Ring (Sparger) Repair Hardware	Structural Support	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-7 (R-99)	3.1.1-35	D, 5

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core Spray Ring (Sparger) Repair Hardware	Structural Support	Stainless Steel	Treated Water	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.B1-7 (R-99)	3.1.1-35	D, 5
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Fuel Support Piece	Direct Flow	CASS	Treated Water >482F	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-8 (R-104)	3.1.1-34	B, 8
					Water Chemistry (B.1.2)	IV.B1-8 (R-104)	3.1.1-34	B, 8
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
				Loss of Fracture Toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.1.10)	IV.B1-9 (R-103)	3.1.1-43	A
	Structural Support	CASS	Treated Water >482F (Internal)	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-8 (R-104)	3.1.1-34	B, 8
					Water Chemistry (B.1.2)	IV.B1-8 (R-104)	3.1.1-34	B, 8
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fuel Support Piece	Structural Support	CASS	Treated Water >482F (Internal)	Loss of Fracture Toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.1.10)	IV.B1-9 (R-103)	3.1.1-43	A
Incore Neutron Monitor Dry Tubes, Guide Tubes & Housings	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-10 (R-105)	3.1.1-35	B, 3
					Water Chemistry (B.1.2)	IV.B1-10 (R-105)	3.1.1-35	B, 3
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Shroud Repairs (tie rods and lug/clevis assemblies)	Structural Support	Nickel Alloy	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-2 (R-96)	3.1.1-35	D
					Water Chemistry (B.1.2)	IV.B1-2 (R-96)	3.1.1-35	D
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Shroud Repairs (tie rods and lug/clevis assemblies)	Structural Support	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-1 (R-92)	3.1.1-35	B, 4
					Water Chemistry (B.1.2)	IV.B1-1 (R-92)	3.1.1-35	B, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A, 4
Shroud Support Structure	Pressure Boundary	Nickel Alloy	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-2 (R-96)	3.1.1-35	B
					Water Chemistry (B.1.2)	IV.B1-2 (R-96)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
	Structural Support	Nickel Alloy	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-2 (R-96)	3.1.1-35	B
					Water Chemistry (B.1.2)	IV.B1-2 (R-96)	3.1.1-35	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A

Table 3.1.2.1.4 Reactor Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Top Guide (Upper Core Grid)	Structural Support	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-16 (R-98)	3.1.1-35	B, 6
					Water Chemistry (B.1.2)	IV.B1-16 (R-98)	3.1.1-35	B, 6
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.B1-14 (R-53)	3.1.1-1	A
Vessel Steam Dryer	Structural Support	Stainless Steel	Steam	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.B1-15 (RP-18)	3.1.1-20	E, 1, 7
					Water Chemistry (B.1.2)	IV.B1-15 (RP-18)	3.1.1-20	E, 1, 7

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The Oyster Creek Vessel Internals program will be enhanced to include inspection of the reactor vessel steam dryer. The program inspection requirements will follow the guidelines of BWRVIP-139 when approved by the NRC.
2. These core plate components are not identified in NUREG-1801 for this reference.
3. Incore neutron monitor dry tubes are periodically replaced and are short lived.
4. Includes the keeper plate, upper bracket, lateral support (bumper), and lower attachment hooks
5. Core spray repair hardware are not identified in NUREG-1801 for this reference.
6. The top guide has exceeded the IASCC threshold. The Oyster Creek Vessel Internals program will be revised to include the additional top guide inspections described in XI.M9 (BWR Vessel Internals).
7. The dryer enivronment includes treated water internally.
8. CASS material for this item is assumed to be a subset of Stainless Steel for this aging effect.

Table 3.1.2.1.5
Reactor Pressure Vessel
Summary of Aging Management Evaluation

Table 3.1.2.1.5 Reactor Pressure Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzle (Bottom head drain)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2
					Water Chemistry (B.1.2)			H, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D-27 (E-08)	3.2.1-10	C
					Water Chemistry (B.1.2)	V.D-27 (E-08)	3.2.1-10	D
Nozzle Safe Ends (Core Spray, Isolation Condenser & CRD Return)	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzle Safe Ends (Core Spray, Isolation Condenser & CRD Return)	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.A1-1 (R-68)	3.1.1-32	B
					Water Chemistry (B.1.2)	IV.A1-1 (R-68)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Nozzle Safe Ends (Feedwater & Main Steam)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2
					Water Chemistry (B.1.2)			H, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D-27 (E-08)	3.2.1-10	A

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzle Safe Ends (Feedwater & Main Steam)	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D-27 (E-08)	3.2.1-10	B
Nozzle Safe Ends (Recirculation Inlet & outlet)	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.A1-1 (R-68)	3.1.1-32	B
					Water Chemistry (B.1.2)	IV.A1-1 (R-68)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Nozzle Thermal Sleeves (CRD Return Line)	Direct Flow	Stainless Steel	Treated Water	Cracking Initiation and Growth	BWR Control Rod Drive Return Line Nozzle (B.1.6)	IV.A1-1 (R-68)	3.1.1-32	E, 8
					Water Chemistry (B.1.2)	IV.A1-1 (R-68)	3.1.1-32	D
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Nozzle Thermal Sleeves (Feedwater Nozzle)	Direct Flow	Nickel Alloy	Treated Water	Cracking Initiation and Growth	BWR Feedwater Nozzle (B.1.5)	IV.A1-1 (R-68)	3.1.1-32	E, 9

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzle Thermal Sleeves (Feedwater Nozzle)	Direct Flow	Nickel Alloy	Treated Water	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.A1-1 (R-68)	3.1.1-32	D
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Nozzles (Core Spray)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2
					Water Chemistry (B.1.2)			H, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Nozzles (CRD Return)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Control Rod Drive Return Line Nozzle (B.1.6)	IV.A1-2 (R-66)	3.1.1-36	B

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzles (CRD Return)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Nozzles (Feedwater)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2
					BWR Feedwater Nozzle (B.1.5)	IV.A1-3 (R-65)	3.1.1-37	B
					Water Chemistry (B.1.2)			H, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D-27 (E-08)	3.2.1-10	C
					Water Chemistry (B.1.2)	V.D-27 (E-08)	3.2.1-10	D
Nozzles (Isolation Condenser)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzles (Isolation Condenser)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2, 4
					Water Chemistry (B.1.2)			H, 2, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A, 4
Nozzles (Main Steam)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2, 4
					Water Chemistry (B.1.2)			H, 2, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D-27 (E-08)	3.2.1-10	C
					Water Chemistry (B.1.2)	V.D-27 (E-08)	3.2.1-10	D

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzles (Recirculation Inlet & Outlet)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2
					Water Chemistry (B.1.2)			H, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Penetrations (CRD Stub Tubes)	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.A1-5 (R-69)	3.1.1-31	E, 7
					Water Chemistry (B.1.2)	IV.A1-5 (R-69)	3.1.1-31	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
	Structural Support	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	BWR Vessel Internals (B.1.9)	IV.A1-5 (R-69)	3.1.1-31	E, 7
					Water Chemistry (B.1.2)	IV.A1-5 (R-69)	3.1.1-31	B

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetrations (CRD Stub Tubes)	Structural Support	Stainless Steel	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Penetrations (Instrumentation including safe ends)	Pressure Boundary	Nickel Alloy	Containment Atmosphere (External)	None	None	IV.E-2 (RP-03)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Penetrations (B.1.8)	IV.A1-5 (R-69)	3.1.1-31	B
					Water Chemistry (B.1.2)	IV.A1-5 (R-69)	3.1.1-31	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Penetrations (B.1.8)	IV.A1-5 (R-69)	3.1.1-31	B
					Water Chemistry (B.1.2)	IV.A1-5 (R-69)	3.1.1-31	B

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetrations (Instrumentation including safe ends)	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Penetrations (Standby Liquid Control)	Pressure Boundary	Nickel Alloy	Containment Atmosphere (External)	None	None	IV.E-2 (RP-03)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Penetrations (B.1.8)	IV.A1-5 (R-69)	3.1.1-31	B
					Water Chemistry (B.1.2)	IV.A1-5 (R-69)	3.1.1-31	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
RPV Support Skirt and Attachment Welds	Structural Support	Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-7 (R-70)	3.1.1-1	A
Top Head Closure Studs and Nuts	Mechanical Closure	High Strength Alloy Steel	Containment Atmosphere	Cracking Initiation and Growth	Reactor Head Closure Studs (B.1.3)	IV.A1-8 (R-60)	3.1.1-42	B, 10
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Top Head Enclosure (Head & Nozzles)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Top Head Enclosure (Head & Nozzles)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2, 3, 4
					Water Chemistry (B.1.2)			H, 2, 3, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A, 4
Top Head Enclosure Vessel Flange Leak Detection Penetration	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.A1-9 (R-61)	3.1.1-10	E, 6
Top Head Flange	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2, 4
					Water Chemistry (B.1.2)			H, 2, 4

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Top Head Flange	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Steam (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A, 4
Vessel Bottom Head	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2
					Water Chemistry (B.1.2)			H, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
Vessel Shell (Upper, upper intermediate, lower intermediate, lower, and belt line welds)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Treated Water >482F (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Vessel Shell (Upper, upper intermediate, lower intermediate, lower, and belt line welds)	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Treated Water >482F (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)			H, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A
				Loss of Fracture Toughness	Reactor Vessel Surveillance (B.1.23)	IV.A1-13 (R-63)	3.1.1-7	A
					TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-12 (R-62)	3.1.1-6	A, 5
Vessel Shell Attachment Welds	Structural Support	Nickel Alloy	Treated Water (Internal)	Cracking Initiation and Growth	BWR Vessel ID Attachment Welds (B.1.4)	IV.A1-11 (R-64)	3.1.1-33	B
					Water Chemistry (B.1.2)	IV.A1-11 (R-64)	3.1.1-33	B

Table 3.1.2.1.5 Reactor Pressure Vessel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Vessel Shell Flange	Pressure Boundary	Carbon and low alloy steel (with stainless steel cladding)	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)			H, 2, 4
					Water Chemistry (B.1.2)			H, 2, 4
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.A1-6 (R-04)	3.1.1-2	A, 4

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
2. This component is made of SA 105 Grade II carbon steel. Management of cracking for this reactor vessel component made of this material is not described in NUREG 1801. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program includes inspection of these components for cracking initiation and growth; therefore the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD and Water Chemistry programs are credited here for managing the effects of Cracking Initiation and Growth for this component.
3. NUREG 1801 line reference IV.A1-10 (R-59) identifies loss of material as an applicable aging effect for top head enclosures fabircated with steel. The Oyster Creek top head enclosure is fabricated with steel but contains a stainless steel clad which is not susceptible to loss of material. As such, loss of material was not selected as an applicable aging effect for this component.

4. The environment of steam is considered similar to the environment of reactor coolant or treated water for evaluation of this component and material, consistent with the environment definitions in NUREG-1801 Chapter IX.
5. Loss of fracture toughness due to neutron embrittlement was evaluated Appendix G of 10CFR50 and RG 1.99, following the guidance of BWRVIP-74A.
6. The environment of Treated Water includes the environment of air with reactor coolant leakage descibed in NUREG-1801.
7. The BWR Penetrations program does not address CRD stub tubes. The CRD stub tubes are addressed in the BWR Vessel Internals program.
8. The integrity of the CRD return line thermal sleeve is inspected as part of the BWR CRD Return Line Nozzle aging management program.
9. The integrity of the feedwater nozzle thermal sleeve is inspected as part of the BWR Feedwater Nozzle aging management program.
10. The operating experience for these components indicates that nicks, scratches, gouges, and thread damage have occurred due to maintenance activities during refueling outages. These were determined to be acceptable for continued service. There have been no deficiencies attributed to distortion/plastic deformation from stress relaxation or loss of material due to mechanical wear.

Table 3.1.2.1.6
Reactor Recirculation System
Summary of Aging Management Evaluation

Table 3.1.2.1.6 Reactor Recirculation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 5
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 5
		Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 5

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
					Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 5
					Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Coolers (oil)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External) - shell	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal) shell side components	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-3 (AP-39)	3.3.1-21	E
					One-Time Inspection (B.1.24)	VII.H2-3 (AP-39)	3.3.1-21	E
Filter Housing (oil)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					Water Chemistry (B.1.2)	IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Fluid Drive (M-G Set Coupling) - Reservoir	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
Oil Mist Eliminator - Reservoir	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Oil Mist Eliminator - Reservoir	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B
						IV.C1-9 (R-22)	3.1.1-32	E, 2
					BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Pump Casing	Pressure Boundary	CASS	Containment Atmosphere (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Treated Water >482F (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-10 (R-20)	3.1.1-32	B
					Water Chemistry (B.1.2)	IV.C1-10 (R-20)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Fracture Toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-4 (R-08)	3.1.1-47	B

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Pressure Boundary	CASS	Treated Water >482F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 1
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 1
Sight Glasses (oil)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
		Glass	Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Lubricating Oil (Internal)	None	None	VII.J-12 (AP-15)	3.3.1-75	A
Thermowell	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 6
						IV.C1-2 (R-55)	3.1.1-21	E, 4, 6

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 6
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	CASS	Containment Atmosphere (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Treated Water >482F (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-10 (R-20)	3.1.1-32	B
					Water Chemistry (B.1.2)	IV.C1-10 (R-20)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Fracture Toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-4 (R-08)	3.1.1-47	B
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 1
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 1

Table 3.1.2.1.6 Reactor Recirculation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 6
						IV.C1-2 (R-55)	3.1.1-21	E, 4, 6
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 4, 6
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. CASS material for this item is assumed to be a subset of Stainless Steel for this aging effect.
2. The program for ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD is applied in addition to the NUREG-1801 specified programs for this item.
3. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
4. ASME XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to cracking of these items.
5. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
6. The applicable programs for the aging effect of cracking as identified in IV.C1-1 (R-03) and IV.C1-2 (R-55) for Class 1 piping, fittings, and branch

connections < NPS 4 have been applied to components < NPS 4.

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES

3.2.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.2, Engineered Safety Features, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Containment Spray System (2.3.2.2)
- Core Spray System (2.3.2.3)
- Standby Gas Treatment System (2.3.2.4)

3.2.2 RESULTS

3.2.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Management Programs For The Engineered Safety Features

3.2.2.1.1 Containment Spray System

Materials

The materials of construction for the Containment Spray System components are:

- Alloy Steel
- Carbon and Low Alloy Steel
- Cast Iron
- Stainless Steel

Environments

The Containment Spray System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Soil
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Containment Spray System components require management:

- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Spray System components:

- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Periodic Testing of Containment Spray Nozzles
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.2.2.1.1, Summary of Aging Management Evaluation – Containment Spray System summarizes the results of the aging management review for the Containment Spray System.

3.2.2.1.2 Core Spray System

Materials

The materials of construction for the Core Spray System components are:

- Alloy Steel
- Carbon and Low Alloy Steel
- Cast Austinetic Stainless Steel (CASS)
- Glass
- Stainless Steel

Environments

The Core Spray System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Treated Water
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Core Spray System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Core Spray System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

- Bolting Integrity
- BWR Stress Corrosion Cracking
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.2.2.1.2, Summary of Aging Management Evaluation – Core Spray System summarizes the results of the aging management review for the Automatic Depressurization System.

3.2.2.1.3 Standby Gas Treatment System

Materials

The materials of construction for the Standby Gas Treatment System components are:
- Aluminum
- Brass
- Carbon and Low Alloy Steel
- Cast Iron
- Copper
- Elastomer
- Galvanized Steel
- Plexiglass
- Stainless Steel

Environments

The Standby Gas Treatment System components are exposed to the following environments:
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Standby Gas Treatment System components require management:
- Change in Material Properties
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Standby Gas Treatment System components:
- Periodic Inspection of Ventilation Systems (B.2.4)
- Structures Monitoring Program (B.1.31)

Table 3.2.2.1.3, Summary of Aging Management Evaluation – Standby Gas Treatment System summarizes the results of the aging management review for the Standby Gas Treatment System.

3.2.2.2 AMR Results Consistent with the GALL Report for Which Further Evaluation is Recommended

NUREG 1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the LRA. For the Engineered Safety Features, those programs are addressed in the following subsections.

3.2.2.2.1 Cumulative Fatigue Damage (BWR/PWR)

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of Fatigue as a TLAA for the non-Class 1 portions of the Core Spray System, Containment Spray System, and Isolation Condenser System is discussed in Section 4.3.3.

3.2.2.2.2 Loss of Material due to General Corrosion (BWR/PWR)

Loss of material due to general corrosion could occur for the internal and external surfaces of BWR and PWR steel components exposed to air and moisture. The GALL report recommends further evaluation on a plant specific basis to ensure that the aging effect is adequately managed.

Oyster Creek will use the 10CFR50 Appendix J program, B.1.29, in association with the ASME Section XI, Subsection IWE program, B.1.27, to inspect piping and fittings in the Containment Vacuum Breaker System. The primary containment leakage rate testing program provides for aging management of pressure boundary degradation due to loss of material in systems penetrating primary containment. The primary containment inservice inspection (ISI) program utilizes inspections for degradation of accessible surface areas. Together, these programs detect degradation of the vacuum breaker system prior to the loss of intended function. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The 10CFR50 Appendix J program and ASME Section XI, Subsection IWE program are described in Appendix B.

The Periodic Inspection of Ventilation Systems program, B.2.4, will be used to perform visual inspections of piping, piping components, piping elements, and fan and damper housings for the Standby Gas Treatment System. Program activities include periodic visual inspections and systems tests to ensure aging degradation is detected prior to loss of intended function. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection of Ventilation Systems program is described in Appendix B.

The One-Time Inspection program, B.1.24, will be used to inspect the isolation condenser shell and shell side components and the internal surfaces of carbon steel vent piping in an indoor air environment in the Isolation Condenser System. When not in service, portions of the isolation condenser shell and the ventilation piping contain indoor air, and inspection of the internal surfaces verifies that unacceptable degradation is not occurring and that the component intended function will be maintained during the extended period of operation. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The One-Time Inspection program is described in Appendix B.

The Structures Monitoring program, B.1.31, will be used to inspect the external surfaces of steel piping, piping components, piping elements, and ducting in an indoor air or outdoor air environment for the Containment Spray System, Core Spray System, Standby Gas Treatment System, Containment Vacuum Breakers System, Isolation Condenser System, Post-Accident Sampling System, and Drywell Floor and Equipment Drains System when there are no other aging management programs that inspect the items. The Structures Monitoring program directs periodic visual inspections to identify and evaluate the degradation of the inspected items to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Maintenance Rule Structures Monitoring Program is described in Appendix B.

The external surfaces of the Reactor Pressure Vessel nozzles in an environment of containment atmosphere do not require an aging management program. The aging effect of loss of material due to general corrosion in the Primary Containment atmosphere does not need to be considered for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. Therefore, there is no loss of material for carbon steel components exposed to a containment nitrogen environment because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. This conclusion is supported by past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1).

3.2.2.2.3 Loss of Material due to Pitting and Crevice Corrosion (BWR/PWR)

1. Loss of material due to pitting and crevice corrosion could occur for stainless steel piping, piping components, and piping elements exposed to treated water. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

   Oyster Creek will use the Water Chemistry program, B.1.2, to manage aging of stainless steel piping and components exposed to treated water in the Containment Spray System, Containment Vacuum Breakers System, Condensate Transfer System, Core Spray System, Isolation Condenser System, Nuclear Boiler Instrumentation System, Post-Accident Sampling System, and Reactor Recirculation System. The program activities provide for monitoring and controlling of water chemistry using station procedures and processes for the prevention or mitigation of loss of material aging effects. The One-Time Inspection program, B.1.24, will be used in each of these systems for verification of chemistry control and confirmation of the absence of loss of material. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry program and the One-Time Inspection program are described in Appendix B.

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used to inspect the isolation condenser stainless steel tubes and tube side components to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is described in Appendix B.

2. Loss of material from pitting and crevice corrosion could occur for stainless steel components in contact with soil, untreated, or raw water (including internal condensation). The GALL report recommends that a plant-specific aging management program should be evaluated and that the program specifically address the bottom of partially encased tanks because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

   This Item Number is not used at Oyster Creek. The Engineered Safety Features Systems have no stainless steel piping, piping components or piping elements in contact with soil, untreated, or raw water (including internal condensation). Oyster Creek has no external or partially encased stainless steel tanks in the scope of license renewal.

3.2.2.2.4 <u>Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (BWR/PWR)</u>

Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion (MIC) could occur for steel BWR and PWR containment isolation piping, piping components, and piping elements exposed internally to untreated water in systems that are not addressed in other chapters of the GALL report. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

Oyster Creek will use the One-Time Inspection program, B.1.24, to evaluate for loss of material the steel portion of Drywell Floor and Equipment Drains System piping that provides the containment isolation barrier. The program elements include determination of appropriate inspection sample size, identification of inspection locations, selection of examination techniques with acceptance criteria, and evaluation of results. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The One-Time Inspection program is described in Appendix B.

3.2.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation (BWR)

Hardening and loss of strength due to elastomer degradation could occur in seals associated with BWR standby gas treatment systems. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

Oyster Creek will use the Periodic Inspection of Ventilation Systems program, B.2.4, to evaluate elastomer door seals and flexible connections in the Standby Gas Treatment System. Periodic inspections are performed on elastomer door seals and flexible connections to identify detrimental changes in material properties, as evidenced by cracking, perforations in the material, or leakage. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection of Ventilation Systems program is described in Appendix B.

3.2.2.2.6 Loss of Material due to Erosion (PWR)

This is applicable to PWRs only.

3.2.2.2.7 General, Pitting, Crevice, and Microbiologically Influenced Corrosion, and Fouling (BWR/PWR)

1. Loss of material due to pitting, crevice and microbiologically influenced corrosion, and fouling could occur for the internal surfaces of stainless steel containment isolation piping, piping components, and piping elements in contact with raw or untreated water. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

   Oyster Creek will use the One-Time Inspection program, B.1.24, to evaluate for loss of material the stainless steel portion of Drywell Floor and Equipment Drains System piping that provides the containment isolation barrier. The program elements include determination of appropriate inspection sample size, identification of inspection locations, selection of examination techniques with acceptance criteria, and evaluation of results. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The One-Time Inspection program is described in Appendix B.

2. Loss of material due to general, pitting, crevice and microbiologically influenced corrosion and fouling could occur for steel containment isolation piping, piping components, and piping elements in contact with raw water. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

This Item Number is not used at Oyster Creek. Item Number 3.2.1-5 discussed in 3.2.2.2.4 above addresses loss of material for steel components in an untreated water environment due to pitting, crevice and microbiologically influenced corrosion, and fouling, and was used for Oyster Creek components in lieu of Item Number 3.2.1-9.

3.2.2.2.8 Loss of Material due to General, Pitting and Crevice Corrosion (BWR/PWR)

1. Loss of material due to general, pitting and crevice corrosion could occur for BWR aluminum and steel piping, piping components, and piping elements in contact with treated water. The existing aging management program relies on monitoring and control of water chemistry based on EPRI guidelines of BWRVIP 29 (EPRI TR-103515) for BWRs to mitigate degradation. However, control of water chemistry does not preclude loss of material due to general, pitting, and crevice corrosion at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL report recommends further evaluation of programs to verify the effectiveness of the chemistry control program. A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will use the Water Chemistry program, B.1.2, to manage aging of steel piping, piping components, and piping elements exposed to a treated water environment in the Containment Spray System, Core Spray System, Isolation Condenser System, Post-Accident Sampling System, and Reactor Pressure Vessel. The program activities provide for monitoring and controlling of water chemistry using station procedures and processes for the prevention or mitigation of loss of material aging effects. The One-Time Inspection program, B.1.24, will be used in each of these systems for verification of chemistry control and confirmation of the absence of loss of material. The Periodic Inspection of Containment Spray Nozzles program, B.2.1, will also be used to manage corrosion of steel piping and piping components in the Containment Spray System. Observed conditions that have the potential for impacting the intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry program, the One-Time Inspection program, and the Periodic Inspection of Containment Spray Nozzles program are described in Appendix B.

2. Loss of material due to general, pitting and crevice corrosion could occur for steel ducting closure bolting in uncontrolled air and for the internal surfaces of steel piping, piping components, and piping elements in contact with treated water or subject to wetting by condensation. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

   Oyster Creek will implement a Structures Monitoring Program, B.1.31, to inspect the steel closure bolting in an uncontrolled indoor air external environment for the Standby Gas Treatment System. The Structures Monitoring Program relies on periodic visual inspections by qualified individuals to identify and evaluate the degradation of external surfaces of the bolting to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

The Oyster Creek Engineered Safety Features Systems have no steel piping, piping components, or piping elements (internal surfaces) exposed to condensation, treated water, or air-indoor uncontrolled environments.

3. Loss of material due to general, pitting and crevice corrosion could occur for steel piping, piping components, and piping elements buried in soil. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The staff reviews the applicant's program, including inspection frequency and operating experience with buried components, to assess the effectiveness of the buried piping and tanks inspection program in ensuring that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will implement a Buried Piping Inspection program, B.1.26, to manage the loss of material in steel piping, piping components, and piping elements exposed to soil in the Containment Spray System. The Buried Piping Inspection program includes preventive measures to mitigate corrosion and periodic inspection to manage the effects of corrosion on the pressure-retaining capacity of buried steel piping, piping components, and piping elements. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Buried Piping Inspection program is described in Appendix B.

   Oyster Creek Engineered Safety Features Systems have no buried steel tanks in the scope of license renewal.

3.2.2.2.9 Loss of Material due to General Corrosion and Fouling (BWR)

Loss of material due to general corrosion and fouling can occur for steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces exposed to air - indoor uncontrolled. This could result in plugging of the spray nozzles and flow orifices. This aging mechanism and effect will apply since the spray nozzles and flow orifices are occasionally wetted, even though the majority of the time this system is on standby. The wetting and drying of these components can accelerate corrosion and fouling. The GALL report recommends further evaluation to ensure that the aging effect is adequately managed.

This Item Number is not used at Oyster Creek. The containment spray nozzle and orifice assemblies used at Oyster Creek are stainless steel.

3.2.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Engineered Safety Features system components:

- Section 4.3, Metal Fatigue Analysis

3.2.3 CONCLUSION

The Engineered Safety Features systems piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Engineered Safety Features system components are identified in the summaries in Section 3.2.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Engineered Safety Features system components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-1	Piping, piping components, and piping elements in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.2.2.2.1.
3.2.1-2	Steel components (including piping and ducting) exposed to external condensation or outside air, internally or externally to indoor uncontrolled air	Loss of material due to general corrosion	Plant specific	Yes, plant specific	The 10CFR50 Appendix J program, B.1.29, in association with the ASME Section XI, Subsection IWE program, B.1.27, is used to inspect piping and fittings in the Containment Vacuum Breaker System. The Periodic Inspection of Ventilation Systems program, B.2.4, will be used to manage aging effects by visually inspecting piping, piping components, piping elements, and fan and damper housings in the Standby Gas Treatment System. The One-Time Inspection program, B.1.24, will be used to manage aging effects by inspecting the isolation condenser shell and shell side components, and internal surfaces of carbon steel vent piping in an indoor air environment in the Isolation Condenser System. The Structures Monitoring program, B.1.31, will be used to manage aging effects by inspecting the external surfaces of steel piping, piping components, piping elements, and ducting in an indoor air or outdoor air

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					environment for various ESF Systems. The external surfaces of the Reactor Pressure Vessel nozzles in an environment of containment atmosphere do not require an aging management program due to negligible amounts of free oxygen. See subsection 3.2.2.2.2.
3.2.1-3	Stainless steel piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	The Water Chemistry program, B.1.2, will be used to manage aging of stainless steel piping and components exposed to treated water. The One-Time Inspection program, B.1.24, is used for verification of chemistry control and confirmation of the absence of loss of material. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, B.1.1, will be used to inspect the isolation condenser stainless steel tubes and tube side components to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. See subsection 3.2.2.2.3.1.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-4	Stainless steel piping, piping components, and piping elements exposed to soil, untreated or raw water, or internal condensation; partially encased stainless steel tanks with breached moisture barrier exposed to raw or untreated water	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated. Pitting and crevice corrosion of tank bottoms are of concern because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes, plant specific	Not Applicable. The Oyster Creek Engineered Safety Features Systems have no stainless steel piping, piping components or piping elements in contact with soil, untreated, or raw water (including internal condensation). Oyster Creek has no external or partially encased stainless steel tanks in the scope of license renewal. See subsection 3.2.2.2.3.2.
3.2.1-5	Steel containment isolation piping and components internal surfaces exposed to untreated water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to evaluate the steel portion of Drywell Floor and Equipment Drains System piping that provides the containment isolation barrier. See subsection 3.2.2.2.4.
3.2.1-6	Elastomer seals in standby gas treatment system exposed to air - indoor uncontrolled	Hardening and loss of strength due to elastomer degradation	Plant specific	Yes, plant specific	The Periodic Inspection of Ventilation Systems program, B.2.4, will be used to evaluate elastomer door seals and flexible connections in the Standby Gas Treatment system. See subsection 3.2.2.2.5.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-7	PWR Only				
3.2.1-8	Stainless steel containment isolation piping and components internal surfaces exposed to raw or untreated water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated. See IN 85-30 for evidence of microbiologically influenced corrosion.	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to evaluate for loss of material the stainless steel portion of Drywell Floor and Equipment Drains System piping that provides the containment isolation barrier. See subsection 3.2.2.2.7.1.
3.2.1-9	Steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated. See IN 85-30 for evidence of microbiologically influenced corrosion.	Yes, plant specific	Not Applicable. Item Number 3.2.1-5 addresses loss of material for steel components in an untreated water environment due to pitting, crevice and microbiologically influenced corrosion, and fouling, and was used for Oyster Creek components. See subsection 3.2.2.2.7.2.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-10	Steel and aluminum 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.	Oyster Creek will use the Water Chemistry program, B.1.2, to manage aging of steel piping, piping components, and piping elements exposed to a treated water environment in the Containment Spray System, Core Spray System, Isolation Condenser System, Post-Accident Sampling System, and Reactor Pressure Vessel. The One-Time Inspection program, B.1.24, will be used in each of these systems for verification of chemistry control and confirmation of the absence of loss of material. The Periodic Testing of Containment Spray Nozzles program (B.2.1) will also be used to manage loss of material due to corrosion in the Containment Spray System. See subsection 3.2.2.2.8.1.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-11	Steel piping, piping components, and piping elements (internal surfaces) and ducting closure bolting exposed to condensation (internal), treated water, or air – indoor uncontrolled (external)	Loss of material due to general, pitting and crevice corrosion	Plant specific	Yes, plant specific	Oyster Creek will implement a Structures Monitoring Program, B.1.31, to inspect the steel closure bolting in an uncontrolled indoor air external environment of ductwork in the Standby Gas Treatment System. The Structures Monitoring Program manages aging effects with periodic visual inspections to identify and evaluate the degradation of external surfaces of the bolting to ensure that there is no loss of intended function. The Oyster Creek Engineered Safety Features Systems have no steel piping, piping components, or piping elements (internal surfaces) exposed to condensation, treated water, or air-indoor uncontrolled environments. See subsection 3.2.2.2.8.2.
3.2.1-12	Steel piping, piping components, and piping elements buried in soil	Loss of material due to general, pitting and crevice 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	The Buried Piping Inspection Program, B.1.26, will be used to manage the loss of material in steel piping, piping components, and piping elements exposed to soil. The Oyster Creek Engineered Safety Features Systems have no buried steel tanks in the scope of license renewal. See subsection 3.2.2.2.8.3.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-13	Steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces exposed to air - indoor uncontrolled	Loss of material due to general corrosion and fouling	Plant specific	Yes, plant specific	Not Applicable. The containment spray nozzle and orifice assemblies used at Oyster Creek are stainless steel. See Item Number 3.2.1-35. See subsection 3.2.2.2.9.
3.2.1-14	Cast austenitic stainless steel piping, piping components, and piping elements exposed to treated water (borated or unborated) >250°c (>482°f)	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	Not Applicable. Oyster Creek has no CASS components susceptible to thermal aging embrittlement located in the portions of the ESF Systems governed by Group B Quality Standards. CASS components located in the portions of the ESF Systems governed by Group A Quality Standards are discussed in Item Number 3.1.1-43 and Item Number 3.1.1-47.
3.2.1-15	Stainless steel piping, piping components, and piping elements exposed to treated water >60°c (>140°f)	Cracking due to Stress corrosion cracking and intergranular stress corrosion cracking	BWR Stress Corrosion Cracking and Water Chemistry	No	Not Applicable. Oyster Creek has no stainless steel piping, piping components, or piping elements susceptible to stress corrosion cracking or intergranular stress corrosion cracking located in the portions of the ESF Systems governed by Group B Quality Standards. These items located in the portions of the ESF Systems governed by Group A Quality Standards are discussed in Item Number 3.1.1-9.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-16	Steel piping, piping components, and piping elements exposed to air and steam or treated water	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	No	Not Applicable. Oyster Creek has no steel piping, piping components, or piping elements susceptible to flow-accelerated corrosion in the portions of the ESF Systems governed by Group B Quality Standards, as these portions of the ESF Systems are low-temperature systems.
3.2.1-17	Copper alloy piping, piping components, piping elements, and heat exchanger tubes exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Not Applicable. Oyster Creek has no copper alloy piping, piping components, or piping elements exposed to closed cycle cooling water in the ESF Systems.
3.2.1-18	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger tubes exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Not Applicable. Oyster Creek has no copper alloy piping, piping components, or piping elements containing >15% Zn exposed to closed cycle cooling water in the ESF Systems.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-19	Gray cast iron motor cooler exposed to treated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801. Oyster Creek will use the Selective Leaching of Materials program, B.1.25, which uses one-time inspections to determine if loss of material due to selective leaching is occurring to the cast iron pump housing in a treated water environment in the Containment Spray System.
3.2.1-20	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	Not Applicable. Oyster Creek ha no high-strength steel closure bolting in the ESF Systems.
3.2.1-21	Stainless steel piping, piping components, piping elements, and heat exchanger shell side components (including tubes) serviced by closed-cycle cooling system	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Not Applicable. Oyster Creek has no stainless steel piping, piping components, piping elements, or heat exchanger shell side components including tubes exposed to a closed cycle cooling water environment in the ESF Systems.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-22	Stainless steel heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Not Applicable. Oyster Creek has no stainless steel heat exchanger tubes exposed to a closed cycle cooling water environment in the ESF Systems.
3.2.1-23	Stainless steel heat exchanger shell side components (including tubes) exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not Applicable. Oyster Creek has no stainless steel heat exchanger shell side components including tubes exposed to a raw water environment in the ESF Systems.
3.2.1-24	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry	No	Consistent with NUREG-1801, with exceptions. The Water Chemistry program, B.1.2, will be used to manage reduction of heat transfer due to fouling of stainless steel heat exchanger tubes in the Isolation Condenser System exposed to treated water. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry program implementation.
3.2.1-25	Steel bolting and closure bolting exposed to air with steam or water leakage, air – outdoor (external), or air – indoor uncontrolled	Loss of material due to general, pitting and crevice corrosion; loss of preload due to stress relaxation	Bolting Integrity	No	Oyster Creek will implement a Bolting Integrity program, B.1.12, to inspect steel bolting in an indoor air, outdoor air, and containment atmosphere environment for various systems. The program manages aging effects in the systems by performing visual inspections for pressure retaining bolted joint leakage. The

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
	(external)				activities are implemented through station procedures. Oyster Creek will implement a Structures Monitoring Program, B.1.31, to inspect the steel closure bolting in an outdoor air external environment of ductwork in the Standby Gas Treatment System for loss of material. The Structures Monitoring Program relies on periodic visual inspections to identify and evaluate the degradation of external surfaces of the bolting to ensure that there is no loss of intended function. Oyster Creek will use the 10 CFR Part 50, Appendix J program, B.1.29, to demonstrate leak-tightness and structural integrity of primary containment pressure retaining bolting. The ASME Section XI, Subsection IWE program, B.1.27, will be used in addition to visually inspect this bolting for loss of material.
3.2.1-26	Steel heat exchanger shell side components exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Not Applicable. Oyster Creek has no steel heat exchanger shell side components exposed to closed cycle cooling water in the ESF Systems.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-27	Steel heat exchanger shell side components (including tubes) exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not Applicable. Oyster Creek has no steel heat exchanger shell side components including tubes exposed to raw water in the ESF Systems.
3.2.1-28	Steel and stainless steel heat exchanger tubes (serviced by open-cycle cooling water) exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	Not Applicable. Oyster Creek has no steel or stainless steel heat exchanger tubes exposed to open cycle cooling water or raw water in the ESF Systems.
3.2.1-29	PWR Only				
3.2.1-30	PWR Only				
3.2.1-31	PWR Only				

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-32	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.
3.2.1-33	Glass piping, piping components, and piping elements exposed to air – indoor uncontrolled (external), lubricating oil, raw water, or treated borated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-34	Stainless steel piping, piping components, and piping elements exposed to concrete or lubricating oil	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-35	Stainless steel, cast austenitic stainless steel, galvanized 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.
3.2.1-36	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external), or concrete	None	None	NA - No AEM or AMP	Not Applicable. Oyster Creek has no steel piping, piping components, or piping elements exposed to an air-indoor controlled (external) environment or concrete environment in the ESF Systems.
3.2.1-37	Steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil (no water pooling)	None	None	NA - No AEM or AMP	Not Applicable. Oyster Creek has no steel or copper alloy piping, piping components, or piping elements exposed to a lubrication oil (no water pooling) environment in the ESF Systems.

Table 3.2.1 Summary of Aging Management Evaluations for the Engineered Safety Features

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-38	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Not Applicable. Oyster Creek has no steel, stainless steel, or copper alloy piping, piping components, or piping elements exposed to a gas environment in the ESF Systems.
3.2.1-39	PWR Only				
3.2.1-40	PWR Only				

Table 3.2.2.1.1
Containment Spray System
Summary of Aging Management Evaluation

Table 3.2.2.1.1 Containment Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B, 3
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
		Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B, 3
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B

Table 3.2.2.1.1 Containment Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Heat Exchangers (Cont. Spray)								6
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	V.B-8 (E-42)	3.2.1-12	B
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Containment Atmosphere (Internal)	None	None	V.C-1 (E-35)	3.2.1-2	I, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-7 (E-44)	3.2.1-2	E
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	V.D2-26 (E-10)	3.2.1-1	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A

Table 3.2.2.1.1 Containment Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	Periodic Testing of Containment Spray Nozzles (B.2.1)	V.D2-27 (E-08)	3.2.1-10	E, 5
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B, 2
		Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	V.D2-22 (E-16)	3.2.1-1	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Pump Casing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-7 (E-44)	3.2.1-2	E
			Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-7 (E-44)	3.2.1-2	E

Table 3.2.2.1.1 Containment Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Pressure Boundary	Cast Iron	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Selective Leaching of Materials (B.1.25)	V.A-12 (E-43)	3.2.1-19	C
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
Spray Nozzle	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Containment Atmosphere (Internal)	None	None			G, 4
	Spray	Stainless Steel	Containment Atmosphere (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Containment Atmosphere (Internal)	None	None			G, 4
Strainer (ECCS Suction)	Filter	Stainless Steel	Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.2.2.1.1 Containment Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer (ECCS Suction)	Filter	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Stainless Steel	Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Thermowell	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-7 (E-44)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
Valve Body	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-7 (E-44)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A

Table 3.2.2.1.1 Containment Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
		Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
2. Line item V.D2-28 (E-09) for flow-accelerated corrosion is not an applicable aging mechanism as this is a low temperature system.
3. The Aging Management Program for the Aging Effect of "Loss of Material" for the environment of Indoor Air (External) as identified in the referenced NUREG-1801 Volume 2 item was applied to the environment of Containment Atmosphere (External). Aging effects due to exposure to containment atmosphere are bounded by those due to exposure to indoor air, since the containment nitrogen environment is not conducive to promoting aging degradation.
4. NUREG-1801 Volume 2 item V.F-14 (EP-18) lists no aging effect or required Aging Management Program for stainless steel in the air-indoor uncontrolled (external) environment. This has been applied to the spray nozzle internal environment.

5. The Periodic Testing of the Containment Spray Nozzles aging management program conducts periodic tests to verify that the drywell and torus spray nozzles are free from plugging that could result from corrosion product buildup from upstream carbon steel piping sources.
6. The Containment Spray Heat Exchangers are evaluated with the Emergency Service Water System.

Table 3.2.2.1.2
Core Spray System
Summary of Aging Management Evaluation

Table 3.2.2.1.2 Core Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						V.E-5 (EP-24)	3.2.1-25	B, 4

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
					Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
					Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
Cyclone Separator	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Cyclone Separator	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Flow Element	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	V.D2-26 (E-10)	3.2.1-1	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B, 3
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B
						IV.C1-9 (R-22)	3.1.1-32	E, 1

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
						V.D2-22 (E-16)	3.2.1-1	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Pump Casing (Fill Pumps)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Fill Pumps)	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
Pump Casing (Main and Booster Pumps)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
Restricting Orifice	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Throttle	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Glasses	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
		Glass	Indoor Air (External)	None	None	V.F-8 (EP-15)	3.2.1-33	A
			Treated Water (Internal)	None	None	V.F-12 (EP-16)	3.2.1-33	A
Thermowell	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
Valve Body	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
		CASS	Containment Atmosphere (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-10 (R-20)	3.1.1-32	B
					Water Chemistry (B.1.2)	IV.C1-10 (R-20)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E, 2
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E, 2
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A

Table 3.2.2.1.2 Core Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 6
						IV.C1-2 (R-55)	3.1.1-21	E, 5, 6
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 6
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The program for ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD is credited in addition to the NUREWG-1801 recommended programs for this item.
2. CASS material for this item is assumed to be a subset of "Stainless Steel" for this Aging Effect.
3. Line item V.D2-28 (E-09) for flow-accelerated corrosion is not an applicable aging mechanism as this is a low temperature system.
4. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
5. The applicable Aging Management Programs recommended in NUREG 1801 for Class 1 stainless steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 valve bodies < 4 in. N.P.S.
6. ASME Secton XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to cracking of these valves.

Table 3.2.2.1.3
Standby Gas Treatment System (SGTS)
Summary of Aging Management Evaluation

Table 3.2.2.1.3 Standby Gas Treatment System (SGTS)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.B-1 (E-40)	3.2.1-11	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-1 (EP-1)	3.2.1-25	E, 1
		Stainless Steel	Indoor Air (External)	None	None			G, 3
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	A
Damper Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-3 (E-25)	3.2.1-2	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-8 (E-45)	3.2.1-2	E
Door Seal	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-4 (E-06)	3.2.1-6	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-8 (A-73)	3.3.1-28	E

Table 3.2.2.1.3 Standby Gas Treatment System (SGTS) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Door Seal	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-4 (E-06)	3.2.1-6	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-9 (A-18)	3.3.1-28	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Ductwork	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
			Soil (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G, 2
		Plexiglass	Indoor Air (External)	None	None			F, 4
			Indoor Air (Internal)	None	None			F, 4

Table 3.2.2.1.3 Standby Gas Treatment System (SGTS) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fan Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-3 (E-25)	3.2.1-2	E
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.E-8 (E-45)	3.2.1-2	E
Filter Housing	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	V.F-1 (EP-14)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-1 (EP-14)	3.2.1-35	A
		Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	C
			Indoor Air (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	C
Flexible Connection	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-4 (E-06)	3.2.1-6	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
Flow Element	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	C
			Indoor Air (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	C

Table 3.2.2.1.3 Standby Gas Treatment System (SGTS) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Stainless Steel	Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Heater Housing	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C
Piping and fittings	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-2 (E-26)	3.2.1-2	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-3 (E-25)	3.2.1-2	E
		Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.2.2.1.3 Standby Gas Treatment System (SGTS) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Copper	Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
		Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Restricting Orifice	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-2 (E-26)	3.2.1-2	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-3 (E-25)	3.2.1-2	E
	Throttle	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-2 (E-26)	3.2.1-2	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-3 (E-25)	3.2.1-2	E
Thermowell	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	A

Table 3.2.2.1.3 Standby Gas Treatment System (SGTS) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure Boundary	Stainless Steel	Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Valve Body	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
		Cast Iron	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-2 (E-26)	3.2.1-2	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.B-3 (E-25)	3.2.1-2	E
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	V.E-8 (E-45)	3.2.1-2	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.
2. The external surface of the buried ductwork is not accessible for visual inspection by the Structures Monitoring Program. Aging management for this portion of the ductwork exterior surface is incorporated into the Ventilation System Periodic Inspection Aging Management Program.
3. The aging effects for stainless steel ventilation closure bolting in an indoor environment is none. This is consistent with industry guidance.
4. The aging effects for plexiglass (lexan) in an indoor environment (Ventilation Tunnel) is none. This is consistent with industry guidance.

3.3 AGING MANAGEMENT OF AUXILARY SYSTEMS

3.3.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.3, Auxiliary Systems, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- “C” Battery Room Heating & Ventilation (2.3.3.1)
- 4160 V Switchgear Room Ventilation (2.3.3.2)
- 480 V Switchgear Room Ventilation (2.3.3.3)
- Battery and MG Set Room Ventilation (2.3.3.4)
- Chlorination System (2.3.3.5)
- Circulating Water System (2.3.3.6)
- Containment Inerting System (2.3.3.7)
- Containment Vacuum Breakers (2.3.3.8)
- Control Rod Drive System (2.3.3.9)
- Control Room HVAC (2.3.3.10)
- Cranes and Hoists (2.3.3.11)
- Drywell Floor and Equipment Drains (2.3.3.12)
- Emergency Diesel Generator and Auxiliary System (2.3.3.13)
- Emergency Service Water System (2.3.3.14)
- Fire Protection System (2.3.3.15)
- Fuel Storage and Handling Equipment (2.3.3.16)
- Hardened Vent System (2.3.3.17)
- Heating & Process Steam System (2.3.3.18)
- Hydrogen & Oxygen Monitoring System (2.3.3.19)
- Instrument (Control) Air System (2.3.3.20)
- Main Fuel Oil Storage & Transfer System (2.3.3.21)
- Miscellaneous Floor and Equipment Drain System (2.3.3.22)
- Nitrogen Supply System (2.3.3.23)
- Noble Metals Monitoring System (2.3.3.24)
- Post-Accident Sampling System (2.3.3.25)
- Process Sampling System (2.3.3.26)
- Radiation Monitoring System (2.3.3.27)
- Radwaste Area Heating and Ventilation System (2.3.3.28)
- Reactor Building Closed Cooling Water System (2.3.3.29)
- Reactor Building Floor and Equipment Drains (2.3.3.30)
- Reactor Building Ventilation System (2.3.3.31)
- Reactor Water Cleanup System (2.3.3.32)
- Roof Drains and Overboard Discharge (2.3.3.33)
- Sanitary Waste System (2.3.3.34)
- Service Water System (2.3.3.35)
- Shutdown Cooling System (2.3.3.36)
- Spent Fuel Pool Cooling System (2.3.3.37)
- Standby Liquid Control System (Liquid Poison System) (2.3.3.38)

- Traveling In-Core Probe System (2.3.3.39)
- Turbine Building Closed Cooling Water System (2.3.3.40)
- Water Treatment & Distribution System (2.3.3.41

3.3.2 RESULTS

3.3.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Managements Programs For The Auxiliary Systems

3.3.2.1.1 "C" Battery Room Heating & Ventilation

Materials

The materials of construction for the "C" Battery Room Heating & Ventilation components are:

- Brass
- Carbon and low alloy steel
- Copper
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The "C" Battery Room Heating & Ventilation components are exposed to the following environments:

- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the "C" Battery Room Heating & Ventilation components require management:

- Change in Material Properties
- Loss Of Material

Aging Management Programs

The following aging management programs manage the aging effects for the "C" Battery Room Heating & Ventilation components:

- Periodic Inspection of Ventilation Systems
- Structures Monitoring Program

Table 3.3.2.1.1, Summary of Aging Management Evaluation – "C" Battery Room Heating & Ventilation the results of the aging management review for the "C" Battery Room Heating & Ventilation.

3.3.2.1.2 4160 V Switchgear Room Ventilation

Materials

The materials of construction for the 4160 V Switchboard Room Ventilation components are:

- Aluminum
- Carbon and low alloy steel
- Galvanized Steel
- Stainless Steel

Environments

The 4160 V Switchboard Room Ventilation components are exposed to the following environments:

- Indoor Air

Aging Effects Requiring Management

The following aging effects associated with the 4160 V Switchboard Room Ventilation components require management:

- Loss Of Material

Aging Management Programs

The following aging management programs manage the aging effects for the 4160 V Switchboard Room Ventilation components:

- Structures Monitoring Program

Table 3.3.2.1.2, Summary of Aging Management Evaluation – 4160 V Switchboard Room Ventilation summarizes the results of the aging management review for the 4160 V Switchboard Room Ventilation.

3.3.2.1.3 480 V Switchgear Room Ventilation

Materials

The materials of construction for the 480 V Switchgear Room Ventilation components are:

- Aluminum
- Brass
- Carbon and low alloy steel
- Copper
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The 480 V Switchgear Room Ventilation components are exposed to the following environments:

- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the 480 V Switchgear Room Ventilation components require management:

- Change in Material Properties
- Loss Of Material

Aging Management Programs

The following aging management programs manage the aging effects for the 480 V Switchgear Room Ventilation components:

- Periodic Inspection of Ventilation Systems
- Structures Monitoring Program

Table 3.3.2.1.3, Summary of Aging Management Evaluation – 480 V Switchgear Room Ventilation summarizes the results of the aging management review for the 480 V Switchgear Room Ventilation

3.3.2.1.4 Battery and MG Set Room Ventilation

Materials

The materials of construction for the Battery and MG Set Room Ventilation components are:

- Aluminum
- Brass
- Carbon and low alloy steel
- Copper
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The Battery and MG Set Room Ventilation components are exposed to the following environments:

- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Battery and MG Set Room Ventilation require management

- Change in Material Properties
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Battery and MG Set Room Ventilation components:

- Periodic Inspection of Ventilation Systems
- Structures Monitoring Program

Table 3.3.2.1.4, Summary of Aging Management Evaluation – Battery and MG Set Room Ventilation summarizes the results of the aging management review for the Battery and MG Set Room Ventilation.

3.3.2.1.5 Chlorination System

Materials

The materials of construction for the Chlorination System components are:

- Carbon and low alloy steel
- Cast Iron
- Polypropylene
- Polyvinyl Chloride (PVC, CPVC)

Environments

The Chlorination System components are exposed to the following environments:

- Indoor Air
- Outdoor Air
- Raw Water – Salt Water

Aging Effects Requiring Management

The following aging effects associated with the Chlorination System require management

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Chlorination System components:

- Bolting Integrity
- Open-Cycle Cooling Water System
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.5, Summary of Aging Management Evaluation – Chlorination System summarizes the results of the aging management review for the Chlorination System.

3.3.2.1.6 Circulating Water System

Materials

The materials of construction for the Circulating Water System components are:

- Alloy Steel
- Brass
- Bronze
- Carbon and low alloy steel
- Cast Iron
- Copper
- Copper Alloy
- Elastomer
- Glass
- Stainless Steel

Environments

The Circulating Water System components are exposed to the following environments:

- Indoor Air
- Raw Water – Salt Water

Aging Effects Requiring Management

The following aging effects associated with the Circulating Water System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Circulating Water System components:

- Bolting Integrity
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.6, Summary of Aging Management Evaluation – Circulating Water System summarizes the results of the aging management review for the Circulating Water System.

3.3.2.1.7 Containment Inerting System

Materials

The materials of construction for the Containment Inerting System components are:

- Alloy Steel
- Carbon and low alloy steel
- Cast Iron
- Copper
- Copper Alloy
- Stainless Steel

Environments

The Containment Inerting System components are exposed to the following environments:

- Condensation
- Containment Atmosphere
- Dry Gas
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Containment Inerting System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Inerting System components:

- Bolting Integrity
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.7, Summary of Aging Management Evaluation – Containment Inerting System summarizes the results of the aging management review for the Containment Inerting System.

3.3.2.1.8 Containment Vacuum Breakers

Materials

The materials of construction for the Containment Vacuum Breakers components are:

- Carbon and low allow steel
- Stainless Steel

Environments

The Containment Vacuum Breakers components are exposed to the following environments:

- Containment Atmosphere

- Indoor Air
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Containment Vacuum Breakers components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Containment Vacuum Breakers components:

- 10 CFR Part 50, Appendix J
- ASME Section XI, Subsection IWE
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.8, Summary of Aging Management Evaluation – Containment Vacuum Breakers summarizes the results of the aging management review for the Containment Vacuum Breakers.

3.3.2.1.9 <u>Control Rod Drive System</u>

Materials

The materials of construction for the Control Rod Drive System components are:

- Alloy Steel
- Brass
- Carbon and low alloy steel
- High Strength Alloy Steel
- Stainless Steel

Environments

The Control Rod Drive System components are exposed to the following environments:

- Containment Atmosphere
- Dry Gas
- Indoor Air
- Lubricating Oil
- Treated Water
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Control Rod Drive System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Control Rod Drive System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Bolting Integrity
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.9, Summary of Aging Management Evaluation – Control Rod Drive System summarizes the results of the aging management review for the Control Rod Drive System.

3.3.2.1.10 Control Room HVAC

Materials

The materials of construction for the Control Room HVAC components are:

- Aluminum
- Brass
- Carbon and low alloy steel
- Copper
- Elastomer
- Galvanized Steel
- Polyvinyl Chloride (PVC, CPVC)
- Stainless Steel

Environments

The Control Room HVAC components are exposed to the following environments:

- Indoor Air
- Outdoor Air
- Raw Water – Fresh Water
- Refrigerant

Aging Effects Requiring Management

The following aging effects associated with the Control Room HVAC components require management:
- Change in Material Properties
- Loss of Material
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Control Room HVAC components:
- Periodic Inspection of Ventilation Systems
- Structures Monitoring Program

Table 3.3.2.1.10, Summary of Aging Management Evaluation – Control Room HVAC summarizes the results of the aging management review for the Control Room HVAC.

3.3.2.1.11 Cranes and Hoists

Materials

The materials of construction for the Cranes and Hoists components are:
- Carbon and low alloy steel

Environments

The Cranes and Hoists components are exposed to the following environments:
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Cranes and Hoists components require management:
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Cranes and Hoists components:
- Inspection of Overhead Heavy Load and Light Load (Related to Fuel Handling) Handling Systems

Table 3.3.2.1.11, Summary of Aging Management Evaluation – Cranes and Hoists summarizes the results of the aging management review for the Cranes and Hoists

3.3.2.1.12 Drywell Floor and Equipment Drains

Materials

The materials of construction for the Drywell Floor and Equipment Drains components are:

- Alloy Steel
- Carbon and low alloy steel
- Cast Iron
- Glass
- Stainless Steel

Environments

The Drywell Floor and Equipment Drains components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Raw Water – Fresh Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Drywell Floor and Equipment Drains components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Drywell Floor and Equipment Drains components:

- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.12, Summary of Aging Management Evaluation – Drywell Floor and Equipment Drains summarizes the results of the aging management review for the Drywell Floor and Equipment Drains.

3.3.2.1.13 Emergency Diesel Generator and Auxiliary System

Materials

The materials of construction for the Emergency Diesel Generator and Auxiliary System components are:

- Aluminum
- Brass
- Carbon and low alloy steel

- Galvanized Steel
- Glass
- Stainless Steel

Environments

The Emergency Diesel Generator and Auxiliary System components are exposed to the following environments:

- Closed Cooling Water
- Concrete
- Condensation
- Diesel Engine Exhaust Gases
- Fuel Oil
- Indoor Air
- Lubricating Oil
- Oil
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Emergency Diesel Generator and Auxiliary System components require management:

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Emergency Diesel Generator and Auxiliary System components:

- Above Ground Outdoor Tanks
- Bolting Integrity
- Closed Cycle Cooling water System
- Fuel Oil Chemistry
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.13, Summary of Aging Management Evaluation – Emergency Diesel Generator and Auxiliary System summarizes the results of the aging management review for the Emergency Diesel Generator and Auxiliary System.

3.3.2.1.14 Emergency Service Water System

Materials

The materials of construction for the Emergency Service Water System components are:

- Alloy Steel
- Aluminum Bronze
- Brass
- Bronze
- Carbon and low alloy steel
- Copper Alloy
- Elastomer
- Glass
- Nickel Alloy
- Stainless Steel
- Titanium

Environments

The Emergency Service Water System components are exposed to the following environments:

- Indoor Air
- Outdoor Air
- Raw Water – Salt Water
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Emergency Service Water System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Emergency Service Water System components:

- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Open-Cycle Cooling Water System
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.14, Summary of Aging Management Evaluation – Emergency Service Water System summarizes the results of the aging management review for the Emergency Service Water System.

3.3.2.1.15 Fire Protection System

Materials

The materials of construction for the Fire Protection System components are:

- Aluminum
- Aluminum Silica
- Brass
- Bronze
- Carbon and low alloy steel
- Cast Iron
- Concrete
- Copper
- Copper Alloy
- Elastomer
- Grout
- Gypsum Board
- Mecatiss
- Polyethylene
- Pyrocrete
- Stainless Steel
- Thermo-Lag

Environments

The Fire Protection System components are exposed to the following environments:

- Dry Gas
- Fuel Oil
- Indoor Air
- Lubricating Oil
- Outdoor Air
- Raw Water – Fresh Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Fire Protection System components require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Fire Protection System components:

- Aboveground Outdoor Tanks
- Bolting Integrity
- Buried Piping Inspection
- Fire Protection
- Fire Water System
- Fuel Oil Chemistry
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.15, Summary of Aging Management Evaluation – Fire Protection System summarizes the results of the aging management review for the Fire Protection System.

3.3.2.1.16 Fuel Storage and Handling Equipment

Materials

The materials of construction for the Fuel Storage and Handling Equipment components are:

- Aluminum
- Boraflex
- Boral
- Carbon and low alloy steel
- Stainless Steel

Environments

The Fuel Storage and Handling Equipment components are exposed to the following environments:

- Indoor Air
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Fuel Storage and Handling Equipment components require management:

- Loss of Material
- Loss of Preload
- Reduction of Neutron-Absorbing Capacity

Aging Management Programs

The following aging management programs manage the aging effects for the Fuel Storage and Handling Equipment components:

- Boraflex Rack Management Program
- Inspection of Overhead Heavy Load and Light Load (Related to Fuel Handling) Handling Systems
- One-Time Inspection
- Water Chemistry

Table 3.3.2.1.16, Summary of Aging Management Evaluation – Fuel Storage and Handling Equipment summarizes the results of the aging management review for the Fuel Storage and Handling Equipment.

3.3.2.1.17 Hardened Vent System

Materials

The materials of construction for the Hardened Vent System components are:
- Alloy Steel
- Carbon and low alloy steel
- Elastomer
- Stainless Steel

Environments

The Hardened Vent System components are exposed to the following environments:
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Hardened Vent System components require management:
- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Hardened Vent System components:
- Bolting Integrity
- One-Time Inspection
- Structures Monitoring Program

Table 3.3.2.1.17, Summary of Aging Management Evaluation – Hardened Vent System summarizes the results of the aging management review for the Hardened Vent System.

3.3.2.1.18 Heating & Process Steam System

Materials

The materials of construction for the Heating & Process Steam System components are:

- Alloy Steel
- Carbon and low alloy steel
- Cast Iron
- Copper
- Copper Alloy
- Elastomers
- Glass
- Polymers
- Stainless Steel

Environments

The Heating & Process Steam System components are exposed to the following environments:

- Auxiliary Steam
- Boiler Treated Water
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Heating & Process Steam System components require management:

- Change in Material Properties
- Cracking Initiation and Growth
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Heating & Process Steam System components:

- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.18, Summary of Aging Management Evaluation – Heating & Process Steam System summarizes the results of the aging management review for the Heating & Process Steam System.

3.3.2.1.19 Hydrogen & Oxygen Monitoring System

Materials

The materials of construction for the Hydrogen & Oxygen Monitoring System components are:

- Copper Alloy
- Stainless Steel

Environments

The Hydrogen & Oxygen Monitoring System components are exposed to the following environments:

- Condensation
- Containment Atmosphere
- Dry Gas
- Indoor Air

Aging Effects Requiring Management

The following aging effects associated with the Hydrogen & Oxygen Monitoring System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Hydrogen & Oxygen Monitoring System components:

- Bolting Integrity
- One-Time Inspection

Table 3.3.2.1.19, Summary of Aging Management Evaluation – Hydrogen & Oxygen Monitoring System summarizes the results of the aging management review for the Hydrogen & Oxygen Monitoring System.

3.3.2.1.20 Instrument (Control) Air System

Materials

The materials of construction for the Instrument (Control) Air System components are:

- Aluminum
- Brass
- Bronze
- Carbon and low alloy steel
- Copper
- Stainless Steel
- Zinc

Environments

The Instrument (Control) Air System components are exposed to the following environments:

- Containment Atmosphere
- Dry Gas
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Instrument (Control) Air System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Instrument (Control) Air System components:

- Bolting Integrity
- Compressed Air Monitoring
- Structures Monitoring Program

Table 3.3.2.1.20, Summary of Aging Management Evaluation – Instrument (Control) Air System summarizes the results of the aging management review for the Instrument (Control) Air System.

3.3.2.1.21 Main Fuel Oil Storage & Transfer System

Materials

The materials of construction for the Main Fuel Oil Storage & Transfer System components are:

- Brass
- Carbon and low alloy steel
- Cast Iron
- Stainless Steel

Environments

The Main Fuel Oil Storage & Transfer System components are exposed to the following environments:

- Fuel Oil
- Indoor Air

Aging Effects Requiring Management

The following aging effects associated with the Main Fuel Oil Storage & Transfer System components require management:

- Loss of Material

- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Main Fuel Oil Storage & Transfer System components:

- Bolting Integrity
- Fuel Oil Chemistry
- One-Time Inspection
- Structures Monitoring Program

Table 3.3.2.1.21, Summary of Aging Management Evaluation – Main Fuel Oil Storage & Transfer System summarizes the results of the aging management review for the Main Fuel Oil Storage & Transfer System.

3.3.2.1.22 Miscellaneous Floor and Equipment Drain System

Materials

The materials of construction for the Miscellaneous Floor and Equipment Drain System components are:

- Alloy Steel
- Carbon and low alloy steel
- Cast Iron
- Stainless Steel

Environments

The Miscellaneous Floor and Equipment Drain System components are exposed to the following environments:

- Concrete
- Indoor Air
- Lubricating Oil
- Raw Water – Fresh Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Miscellaneous Floor and Equipment Drain System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Miscellaneous Floor and Equipment Drain System components:

- Bolting Integrity
- Buried Piping Inspection
- Lubricating Oil Monitoring Activities
- One-Time Inspection

- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.22, Summary of Aging Management Evaluation – Miscellaneous Floor and Equipment Drain System summarizes the results of the aging management review for the Miscellaneous Floor and Equipment Drain System.

3.3.2.1.23 Nitrogen Supply System

Materials

The materials of construction for the Nitrogen Supply System components are:
- Alloy Steel
- Aluminum
- Brass
- Bronze
- Carbon and low alloy steel
- Copper
- Glass
- Stainless Steel

Environments

The Nitrogen Supply System components are exposed to the following environments:
- Condensation
- Dry Gas
- Encased
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Nitrogen Supply System components require management:
- Loss Of Material
- Loss Of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Nitrogen Supply System components:
- Above Ground Outdoor Tanks
- Bolting Integrity
- One-Time Inspection
- Structures Monitoring Program

Table 3.3.2.1.23, Summary of Aging Management Evaluation – Nitrogen Supply System summarizes the results of the aging management review for the Nitrogen Supply System.

3.3.2.1.24 Noble Metals Monitoring System

Materials

The materials of construction for the Noble Metals Monitoring System components are:

- Alloy Steel
- Carbon and low alloy steel
- Stainless Steel

Environments

The Noble Metals Monitoring System components are exposed to the following environments:

- Indoor Air
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Noble Metals Monitoring System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Noble Metals Monitoring System components:

- Bolting Integrity
- One-Time Inspection
- Water Chemistry

Table 3.3.2.1.24, Summary of Aging Management Evaluation – Noble Metals Monitoring System summarizes the results of the aging management review for the Noble Metals Monitoring System.

3.3.2.1.25 Post-Accident Sampling System

Materials

The materials of construction for the Post-Accident Sampling System components are:

- Alloy Steel
- Carbon and low alloy steel
- Stainless Steel

Environments

The Post-Accident Sampling System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Treated Water
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Post-Accident Sampling System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Post-Accident Sampling System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Bolting Integrity
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.25, Summary of Aging Management Evaluation – Post-Accident Sampling System summarizes the results of the aging management review for the Post-Accident Sampling System.

3.3.2.1.26 Process Sampling System

Materials

The materials of construction for the Process Sampling System components are:

- Alloy Steel
- Carbon and low alloy steel
- Copper
- Elastomer
- Glass
- Stainless Steel

Environments

The Process Sampling System components are exposed to the following environments:

- Closed Cooling Water <140F
- Indoor Air

- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Process Sampling System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Process Sampling System components:

- Bolting Integrity
- Closed Cycle Cooling Water
- One-Time Inspection
- Periodic Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.26, Summary of Aging Management Evaluation – Process Sampling System summarizes the results of the aging management review for the Process Sampling System.

3.3.2.1.27 Radiation Monitoring System

Materials

The materials of construction for the Radiation Monitoring System components are:

- Alloy Steel
- Carbon and low alloy steel
- Stainless Steel

Environments

The Radiation Monitoring System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air

Aging Effects Requiring Management

The following aging effects associated with the Radiation Monitoring System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Radiation Monitoring System components:

- Bolting Integrity

Table 3.3.2.1.27, Summary of Aging Management Evaluation – Radiation Monitoring System summarizes the results of the aging management review for the Radiation Monitoring System.

3.3.2.1.28 Radwaste Area Heating and Ventilation System

Materials

The materials of construction for the Radwaste Area Heating and Ventilation System components are:

- Aluminum
- Carbon and low alloy steel
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The Radwaste Area Heating and Ventilation System components are exposed to the following environments:

- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Radwaste Area Heating and Ventilation System components require management:

- Change in Material Properties
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Radwaste Area Heating and Ventilation System components:

- Periodic Inspection of Ventilation Systems
- Structures Monitoring Program

Table 3.3.2.1.28, Summary of Aging Management Evaluation – Radwaste Area Heating and Ventilation System summarizes the results of the aging management review for the Radwaste Area Heating and Ventilation System.

3.3.2.1.29 Reactor Building Closed Cooling Water System

Materials

The materials of construction for the Reactor Building Closed Cooling Water System components are:

- Alloy Steel
- Aluminum
- Carbon and low alloy steel
- Cast Iron
- Copper
- Copper Alloy
- Glass
- Stainless Steel

Environments

The Reactor Building Closed Cooling Water System components are exposed to the following environments:

- Closed Cooling Water
- Closed Cooling Water < 140F
- Containment Atmosphere
- Indoor Air
- Lubricating Oil
- Soil
- Treated Water
- Treated Water < 140F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Building Closed Cooling Water System components require management:

- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Building Closed Cooling Water System components:

- Bolting Integrity
- Buried Pipe Inspection
- Closed-Cycle Cooling Water System
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.29, Summary of Aging Management Evaluation – Reactor Building Closed Cooling Water System summarizes the results of the aging management review for the Reactor Building Closed Cooling Water System.

3.3.2.1.30 Reactor Building Floor and Equipment Drains

Materials

The materials of construction for the Reactor Building Floor and Equipment Drains components are:

- Alloy Steel
- Carbon and low alloy steel
- Cast Iron
- Stainless Steel

Environments

The Reactor Building Floor and Equipment Drains components are exposed to the following environments:

- Concrete
- Indoor Air
- Raw Water – Fresh Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Building Floor and Equipment Drains components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Building Floor and Equipment Drains components:

- Bolting Integrity
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.30, Summary of Aging Management Evaluation – Reactor Building Floor and Equipment Drains summarizes the results of the aging management review for the Reactor Building Floor and Equipment Drains.

3.3.2.1.31 Reactor Building Ventilation System

Materials

The materials of construction for the Reactor Building Ventilation System components are:

- Aluminum
- Carbon and low alloy steel

- Cast Iron
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The Reactor Building Ventilation System components are exposed to the following environments:

- Concrete
- Containment Atmosphere
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The following aging effects associated with the Reactor Building Ventilation System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Building Ventilation System components:

- 10 CFR Part 50, Appendix J
- Bolting Integrity
- One-Time Inspection
- Periodic Inspection of Ventilation Systems
- Structures Monitoring Program

Table 3.3.2.1.31, Summary of Aging Management Evaluation – Reactor Building Ventilation System summarizes the results of the aging management review for the Reactor Building Ventilation System.

3.3.2.1.32 <u>Reactor Water Cleanup System</u>

Materials

The materials of construction for the Reactor Water Cleanup System components are:

- Alloy Steel
- Carbon and low alloy steel
- Carbon Steel (with elastomer lining)
- CASS
- Cast Iron
- Copper Alloy
- Glass
- Stainless Steel

Environments

The Reactor Water Cleanup System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Lubricating Oil
- Treated Water
- Treated Water < 140F
- Treated Water > 482F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Water Cleanup System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Fracture Toughness
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Water Cleanup System components:

- 10 CFR Part 50, Appendix J
- ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD
- Bolting Integrity
- BWR Reactor Water Cleanup System
- BWR Stress Corrosion Cracking
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.32, Summary of Aging Management Evaluation – Reactor Water Cleanup System summarizes the results of the aging management review for the Reactor Water Cleanup System.

3.3.2.1.33 Roof Drains and Overboard Discharge

Materials

The materials of construction for the Roof Drains and Overboard Discharge components are:

- Alloy Steel
- Bronze
- Carbon and low allow steel
- Polymers

Environments

The Roof Drains and Overboard Discharge components are exposed to the following environments:

- Indoor Air
- Raw Water – Fresh Water
- Raw Water – Salt Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Roof Drains and Overboard Discharge components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Roof Drains and Overboard Discharge components:

- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Open-Cycle Cooling Water System
- Structures Monitoring Program

Table 3.3.2.1.33, Summary of Aging Management Evaluation – Roof Drains and Overboard Discharge summarizes the results of the aging management review for the Roof Drains and Overboard Discharge.

3.3.2.1.34 <u>Sanitary Waste System</u>

Materials

The materials of construction for the Sanitary Waste System components are:

- Cast Iron
- Polyvinyl Chloride (PVC, CPVC)

Environments

The Sanitary Waste System components are exposed to the following environments:

- Indoor Air
- Raw Water – Fresh Water

Aging Effects Requiring Management

The following aging effects associated with the Sanitary Waste System components require management:

- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Sanitary Waste System components:

- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.34, Summary of Aging Management Evaluation – Sanitary Waste System summarizes the results of the aging management review for the Sanitary Waste System.

3.3.2.1.35 Service Water System

Materials

The materials of construction for the Service Water System components are:

- Alloy Steel
- Aluminum
- Brass
- Bronze
- Carbon and low alloy steel
- Cast Iron
- Copper Alloy
- Elastomer
- Glass
- Polyvinyl Chloride (PVC, CPVC)
- Stainless Steel
- Titanium

Environments

The Service Water System components are exposed to the following environments:

- Closed Cooling Water
- Indoor Air
- Lubricating Oil
- Outdoor Air
- Raw Water – Salt Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Service Water System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following aging management programs manage the aging effects for the Service Water System components:

- Bolting Integrity
- Buried Piping Inspection
- Closed-Cycle Cooling Water System
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Open-Cycle Cooling Water System
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.35, Summary of Aging Management Evaluation – Service Water System summarizes the results of the aging management review for the Service Water System.

3.3.2.1.36 Shutdown Cooling System

Materials

The materials of construction for the Shutdown Cooling System components are:

- Alloy Steel
- Carbon and low alloy steel
- Stainless Steel

Environments

The Shutdown Cooling System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Treated Water
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Shutdown Cooling System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Shutdown Cooling System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

- Bolting Integrity
- BWR Stress Corrosion Cracking
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.36, Summary of Aging Management Evaluation – Shutdown Cooling System summarizes the results of the aging management review for the Shutdown Cooling System.

3.3.2.1.37 Spent Fuel Pool Cooling System

Materials

The materials of construction for the Spent Fuel Pool Cooling System components are:

- Aluminum
- Carbon and low alloy steel
- Cast Iron
- Stainless Steel

Environments

The Spent Fuel Pool Cooling System components are exposed to the following environments:

- Concrete
- Containment Atmosphere
- Indoor Air
- Soil
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Spent Fuel Pool Cooling System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Spent Fuel Pool Cooling System components:

- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.37, Summary of Aging Management Evaluation – Spent Fuel Pool Cooling System summarizes the results of the aging management review for the Spent Fuel Pool Cooling System.

3.3.2.1.38 Standby Liquid Control System (Liquid Poison System)

Materials

The materials of construction for the Standby Liquid Control System (Liquid Poison System) components are:
- Alloy Steel
- Brass
- Carbon and low alloy steel
- Copper
- Stainless Steel

Environments

The Standby Liquid Control System (Liquid Poison System) components are exposed to the following environments:
- Containment Atmosphere
- Dry Gas
- Indoor Air
- Sodium Pentaborate
- Treated Water
- Treated Water < 140F

Aging Effects Requiring Management

The following aging effects associated with the Standby Liquid Control System (Liquid Poison System) components require management:
- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Standby Liquid Control System (Liquid Poison System) components:
- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Bolting Integrity
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.38, Summary of Aging Management Evaluation – Standby Liquid Control System (Liquid Poison System) summarizes the results of the aging management review for the Standby Liquid Control System (Liquid Poison System).

3.3.2.1.39 Traveling In-Core Probe System

Materials

The materials of construction for the Traveling In-Core Probe System components are:

- Stainless Steel

Environments

The Traveling In-Core Probe System components are exposed to the following environments:

- Dry Gas
- Indoor Air

Aging Effects Requiring Management

The following aging effects associated with the Traveling In-Core Probe System components require management:

- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Traveling In-Core Probe System components:

- Bolting Integrity

Table 3.3.2.1.39, Summary of Aging Management Evaluation – Traveling In-Core Probe System summarizes the results of the aging management review for the Traveling In-Core Probe System.

3.3.2.1.40 Turbine Building Closed Cooling Water System

Materials

The materials of construction for the Turbine Building Closed Cooling Water System components are:

- Carbon and low alloy steel
- Cast Iron
- Copper
- Copper Alloy
- Galvanized Steel
- Glass
- Stainless Steel

Environments

The Turbine Building Closed Cooling Water System components are exposed to the following environments:

- Closed Cooling Water
- Closed Cooling Water < 140F

- Indoor Air

Aging Effects Requiring Management

The following aging effects associated with the Turbine Building Closed Cooling Water System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Turbine Building Closed Cooling Water System components:

- Bolting Integrity
- Closed-Cycle Cooling Water System
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program

Table 3.3.2.1.40, Summary of Aging Management Evaluation – Turbine Building Closed Cooling Water System summarizes the results of the aging management review for the Turbine Building Closed Cooling Water System.

3.3.2.1.41 Water Treatment & Distribution System

Materials

The materials of construction for the Water Treatment & Distribution System components are:

- Aluminum
- Brass
- Bronze
- Carbon and low alloy steel
- Cast Iron
- Polymers (plastic)
- Stainless Steel

Environments

The Water Treatment & Distribution System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Water Treatment & Distribution System components require management:

- Loss of Material

- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Water Treatment & Distribution System components:

- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.3.2.1.41, Summary of Aging Management Evaluation – Water Treatment & Distribution System summarizes the results of the aging management review for the Water Treatment & Distribution System.

3.3.2.2 AMR Results Consistent with the GALL Report for Which Further Evaluation is Recommended

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the license renewal application. For the Auxiliary Systems, those programs are addressed in the following subsections.

3.3.2.2.1 Cumulative Fatigue Damage (BWR/PWR)

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of metal fatigue as a TLAA for the non-Class 1 portions of the Reactor Water Cleanup System, Noble Metals Monitoring System, Feedwater System, and Shutdown Cooling System is discussed in Section 4.3.3. The evaluation of Crane load cycles as a TLAA is discussed in Section 4.7.1.

3.3.2.2.2 Cracking due to Cyclic Loading (PWR)

This is applicable to PWRs only.

3.3.2.2.3 Cracking due to Stress Corrosion Cracking (BWR/PWR)

1. Cracking due to SCC could occur in the stainless steel piping, piping components, and piping elements of the BWR Standby Liquid Control System that are in contact with sodium pentaborate solution. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines in TR-103515 to manage the effects of cracking due to SCC. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause SCC. Therefore, the GALL report recommends that the effectiveness of the chemistry control program should be verified to ensure that SCC is not occurring. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that stress corrosion cracking is not

occurring and that the component's intended function will be maintained during the period of extended operation.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage stress corrosion cracking of stainless steel components exposed to a sodium pentaborate environment in the Standby Liquid Control System (Liquid Poison System). The management of stress corrosion cracking of Standby Liquid Control System (Liquid Poison System) components exposed to sodium pentaborate relies on monitoring and control of Liquid Poison Tank makeup water chemistry. The makeup water is monitored in lieu of the sodium pentaborate solution since the sodium pentaborate would mask most of the chemistry parameters monitored by the Water Chemistry program. The effectiveness of this approach is verified by a one-time inspection of susceptible locations. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

2. Cracking due to SCC could occur in stainless steel and stainless steel clad piping, piping components, and piping elements and heat exchanger tube and shell side components (including tubes) exposed to treated water and closed cycle cooling water greater than 140 degrees Fahrenheit and to diesel exhaust gases. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

   For Oyster Creek, Item Number 3.3.1-5 for stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust is not used. Emergency Diesel Generator components exposed to diesel exhaust gases are carbon steel and are not susceptible to cracking due to stress corrosion cracking. See Item Number 3.3.1-17 and subsection 3.3.2.2.7.3 for the evaluation of steel diesel engine piping, piping components, and piping elements exposed to diesel exhaust.

   At Oyster Creek, stainless steel components in closed cooling water systems are exposed to a closed cycle cooling water environment < 140°F and are not susceptible to cracking due to stress corrosion cracking. The Reactor Water Cleanup (RWCU) System Non-Regenerative Heat Exchanger shell side components are carbon steel and are not susceptible to cracking due to stress corrosion cracking. Reactor Water Cleanup System Regenerative Heat Exchanger stainless steel tube and shell side components and Non-Regenerative Heat Exchanger stainless steel tube side components are exposed to a treated water environment > 140°F and are susceptible to cracking due to stress corrosion cracking. Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage stress corrosion cracking of stainless steel RWCU heat exchanger components exposed to a treated water environment > 140°F. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

3.3.2.2.4 Cracking due to Stress Corrosion Cracking and Cyclic Loading (BWR/PWR)

1. Cracking due to SCC and cyclic loading could occur for high-strength steel closure bolting in auxiliary systems exposed to air with steam or water leakage The GALL report recommends further evaluation to ensure that these aging effects are managed adequately.

   At Oyster Creek the only Auxiliary System that contains high-strength steel closure bolting exposed to air with steam or water leakage is the Control Rod Drive System. The Bolting Integrity program, B.1.12, addresses aging management requirements for this ASME Class 1 high-strength steel closure bolting. Bolting integrity management follows published EPRI guidelines and other industry recommendations for material selection and testing, inservice inspection (ISI), and plant surveillance and maintenance practices. The extent and schedule of the inspections for the Class 1 high-strength steel closure bolting in the Control Rod Drive System is in accordance with ASME Section XI and assures that detection of leakage or fastener degradation will occur prior to loss of system or component intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Bolting Integrity program is described in Appendix B.

2. Cracking Due to SCC and Cyclic Loading in Stainless Steel Heat Exchanger Tube and Shell Side Components (including tubes) in the Chemical and Volume Control System (PWR) Tubes.

   This is applicable to PWRs only.

3. Cracking Due to SCC and Cyclic Loading in Stainless Steel PWR Regenerative Heat Exchanger Tube and Shell Side Components Including Tubes Exposed to Treated Borated Water >60°C (>140°F).

   This is applicable to PWRs only.

3.3.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation (BWR/PWR)

1. Hardening and loss of strength due to elastomer degradation could occur in elastomer seals and components of heating and ventilation systems. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

   Oyster Creek will implement a Periodic Inspection of Ventilation Systems program, B.2.4, for the internal and external inspection of elastomer components exposed to an indoor air internal or external environment in the "C" Battery Room Heating and Ventilation System, 480V Switchgear Room Ventilation System, Battery and MG Set Room Ventilation System, Control Room HVAC System, Radwaste Area Heating and Ventilation System, and Reactor Building Ventilation System. Periodic inspections are performed on elastomer door seals and flexible connections to identify detrimental changes in material properties, as evidenced by cracking, perforations in the material, or leakage. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection of Ventilation Systems program is described in Appendix B.

Oyster Creek will implement a Structures Monitoring Program, B.1.31, for the external inspections of expansion joint and flexible connection elastomers exposed to an indoor air external environment in the Circulating Water System, Heating & Process Steam System, Fire Protection System, Process Sampling System, Condensate System, and Condensate Transfer System. Oyster Creek utilizes the Structures Monitoring Program to inspect the external surfaces of piping, piping components, and piping elements when there are no aging management programs that specifically inspect the component in question. The Structures Monitoring Program relies on periodic visual inspections by qualified individuals to identify and evaluate the degradation of elastomer components to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

2. Hardening loss of strength due to elastomer degradation could occur in elastomer linings of the filters, valves, and ion exchangers in spent fuel pool cooling and cleanup systems (BWR and PWR). The GALL report recommends that a plant-specific aging management program be evaluated that determines and assesses the qualified life of the linings in the environment to ensure that these aging effects are adequately managed.

   Oyster Creek will implement a Periodic Inspection Program, B.2.5, for the internal inspection of expansion joint and flexible connection elastomers exposed to a treated water internal environment in the Condensate System, Condensate Transfer System, Heating & Process Steam System, and Process Sampling System. Oyster Creek utilizes the Periodic Inspection Program to periodically monitor component aging effects when the component is not covered by other existing periodic monitoring programs. The Periodic Inspection Program relies on periodic inspections to identify and evaluate the internal degradation of elastomer components exposed to a treated water internal environment to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection Program is described in Appendix B.

3.3.2.2.6 Loss of Material Due to General Corrosion (BWR/PWR)

Loss of material due to general corrosion could occur for steel piping, bolting, and component external surfaces exposed to air – indoor uncontrolled (external), air – outdoor (external), or condensation (external). The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

Oyster Creek will implement a Fire Protection program, B.1.19, to inspect the internal and external surfaces of steel piping, piping components, and piping elements exposed to an indoor air internal or external environment, or an outdoor air external environment, for halon/carbon dioxide fire suppression systems. The program provides for periodic system operability testing and visual aging degradation inspections of internal and external surfaces that ensure aging degradation is detected prior to the loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Fire Protection program is described in Appendix B.

Oyster Creek will implement a Fire Water System program, B.1.20, to inspect the external surfaces of steel piping, piping components, and piping elements exposed to an indoor air external or outdoor air external environment for water-based fire protection systems. Program activities include system monitoring, periodic inspections, surveillance testing, and system maintenance activities that ensure aging degradation is detected prior to the loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Fire Water System program is described in Appendix B.

Oyster Creek will implement a Periodic Inspection of Ventilation Systems program, B.2.4, to inspect the internal and external surfaces of steel piping, piping components, piping elements, and ventilation equipment exposed to an indoor air internal or external environment, or an outdoor air external environment in the 480V Switchgear Room Ventilation System, Battery and MG Set Room Ventilation System, Radwaste Area Heating and Ventilation System and Reactor Building Ventilation System. The program will inspect internal and external steel surfaces of ventilation system components to identify and assess aging effects that may be occurring. The program will include surface inspections of steel components for indications of loss of material, such as rust, corrosion, and pitting. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection of Ventilation Systems program is described in Appendix B.

Oyster Creek will implement a Structures Monitoring Program, B.1.31, to inspect the external surfaces of steel piping, piping components, and piping elements in an indoor air external or outdoor air external environment in the Chlorination System, Circulating Water System, Containment Inerting System, Control Rod Drive System, Drywell Floor and Equipment Drains, Emergency Diesel Generator and Auxiliary System, Emergency Service

Water System, Fire Protection System (Dikes only), Hardened Vent System, Instrument (Control) Air System, Main Fuel Oil Storage & Transfer System, Miscellaneous Floor and Equipment Drain System, Nitrogen Supply System, Primary Containment, Process Sampling System, Reactor Building Closed Cooling Water System, Reactor Building Floor and Equipment Drains, Reactor Building Ventilation System, Reactor Head Cooling System, Reactor Recirculation System, Reactor Water Cleanup System, Roof Drains and Overboard Discharge, Sanitary Waste System, Service Water System, Shutdown Cooling System, Spent Fuel Pool Cooling System, Standby Liquid Control System (Liquid Poison System), Turbine Building Closed Cooling Water System, and Water Treatment & Distribution System. The Structures Monitoring Program relies on periodic visual inspections by qualified individuals to identify and evaluate the degradation of piping, piping components, and piping elements to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

At Oyster Creek, the aging effect of loss of material due to general corrosion in the Primary Containment atmosphere is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. Therefore, there is no loss of material for carbon steel components exposed to a containment nitrogen environment because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. This conclusion is supported by past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1).

3.3.2.2.7 Loss of Material due to General, Pitting, and Crevice Corrosion (BWR/PWR)

1. Loss of material due to general pitting, and crevice corrosion could occur in steel piping, tubing, valves, and tanks in the reactor coolant pump oil collection system of fire protection. The fire protection program relies on a combination of visual and volumetric examinations in accordance with the guidelines of 10 CFR Part 50 Appendix R and Branch Technical Position 9.5-1 to manage loss of material from corrosion. However, corrosion may occur at locations where water from wash downs may accumulate. Therefore, the effectiveness of the program should be verified to ensure that corrosion is not occurring. The GALL report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion, to include determining the thickness of the lower portion of the tank. A one-time inspection s an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Item Numbers 3.3.1-13 and 3.3.1-14 are not applicable to Oyster Creek. Appendix R (Section III.O) to 10CFR 50 does not apply because the Primary Containment is inert during normal operation.

2. Loss of material due to general, pitting, and crevice corrosion could occur in aluminum and steel piping, piping component, and piping elements exposed to treated water. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI guidelines of BWRVIP-29 (TR-103515) for water chemistry in BWRs and TR-105714 for primary water chemistry in PWRs to manage the effects of loss of material from general, pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause general, pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL report recommends further evaluation of programs to manage loss of material from general, pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in steel and aluminum piping, piping components, and piping elements exposed to a treated water environment in the Control Rod Drive System, Post-Accident Sampling System, Process Sampling System, Reactor Head Cooling System, Reactor Recirculation System, Reactor Water Cleanup System, Shutdown Cooling System, Spent Fuel Pool Cooling System, Standby Liquid Control System (Liquid Poison System), Water Treatment & Distribution System, and, in aluminum Fuel Pool Gates and fuel storage and handling equipment and structures in the Fuel Storage and Handling Equipment System exposed to a treated water environment. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

   When applied to steel ASME Class MC Components in a treated water environment and to steel ASME Class 2 and 3 Piping and Components in a treated water environment, Oyster Creek will use ASME Section XI, Subsection IWF, B.1.28, to verify the effectiveness of the Water Chemistry Program, B.1.2, to mitigate loss of material. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and ASME Section XI, Subsection IWF programs are described in Appendix B.

3. Loss of material due to general, pitting, and crevice corrosion could occur for steel piping, piping components, piping elements, ducting, closure

bolting, and heat exchanger tubes exposed to air – indoor uncontrolled (internal or external), air -outdoor (external), condensation (internal), moist air, treated water, lubricating oil, or diesel exhaust. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the 10 CFR Part 50, Appendix J program, B.1.29, to manage the loss of material in Primary Containment Boundary steel piping, piping components, and piping elements exposed to an indoor air internal environment in the Reactor Water Cleanup System and Reactor Building Ventilation System. The 10 CFR Part 50, Appendix J program provides for the detection of age related degradation due to loss of material. The program consists of tests performed in accordance with the regulations and guidance provided in 10 CFR 50 Appendix J, Option B and station procedures. Containment leak rate tests are performed to assure that leakage through the primary containment and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the Technical Specifications. An integrated leak rate test (ILRT) is performed during a period of reactor shutdown at the frequency specified in 10 CFR Part 50, Appendix J, Option B. Local leak rate tests (LLRT) are performed on isolation valves and containment access penetrations at frequencies that comply with the requirements of 10 CFR 50 Appendix J, Option B. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The 10 CFR Part 50, Appendix J and One-Time Inspection programs are described in Appendix B.

Oyster Creek will implement a Fire Protection program, B.1.19, to inspect the internal surfaces of steel piping, piping components, and piping elements with an indoor air internal environment for halon/carbon dioxide fire suppression systems. The program provides for periodic system operability testing and visual aging degradation inspections of internal surfaces that ensure aging degradation is detected prior to the loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Fire Protection program is described in Appendix B.

Oyster Creek will implement a Fire Water System program, B.1.20, to inspect the internal surfaces of steel piping, piping components, and piping elements with an indoor air internal environment for water-based fire protection systems. Program activities include system monitoring, periodic inspections, surveillance testing, and system maintenance activities that ensure aging degradation is detected prior to the loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Fire Water System program is described in Appendix B.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in steel piping, piping components, and piping elements exposed to lubricating oil internal or external environments in the Emergency Diesel Generator and Auxiliary System, Reactor Recirculation System, Reactor Water Cleanup System, Reactor Building Closed Cooling Water System, Control Rod Drive System, Fire Protection System, Miscellaneous Floor and Equipment Drain System, and Service Water System. The Lubricating Oil Monitoring Activities program manages physical and chemical properties of lubricating oil by sampling, testing, and trending to identify specific wear mechanisms, contamination, and oil degradation that could affect intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Lubricating Oil Monitoring Activities and One-Time Inspection programs are described in Appendix B.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of Generator Stator Water Chemistry Activities program, B.2.3, to manage the loss of material in steel piping, piping components, piping elements, and heat exchangers exposed to a treated water internal environment in the Main Generator and Auxiliary System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. Generator Stator Water Chemistry Activities and One-Time Inspection programs are described in Appendix B.

Oyster Creek will implement a Periodic Inspection Program, B.2.5, to manage the loss of material in Emergency Diesel Generator ventilation system steel components exposed to an indoor air internal or external environment or an oil external environment. The Periodic Inspection Program will also be used to manage the loss of material in Emergency Diesel Generator ventilation system ductwork exposed to an indoor air internal environment. The Periodic Inspection Program relies on periodic inspections to identify and evaluate the degradation of steel components exposed to an indoor air internal or external environment or an oil external environment to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection Program is described in Appendix B.

Oyster Creek will implement a Periodic Inspection of Ventilation Systems program, B.2.4, to manage the loss of material in ventilation system steel piping, piping components, and piping elements exposed to an indoor air internal or external environment in the “C” Battery Room Heating and Ventilation System, 480V Switchgear Room Ventilation System, Battery and MG Set Room Ventilation System, Control Room HVAC System, Radwaste Area Heating and Ventilation System, and Reactor Building

Ventilation System. The program will inspect internal and external steel surfaces of ventilation system components to identify and assess aging effects that may be occurring. The program will include surface inspections of steel components for indications of loss of material, such as rust, corrosion, and pitting. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection of Ventilation Systems program is described in Appendix B.

Oyster Creek will implement a Structures Monitoring Program, B.1.31, to inspect the external surfaces of steel piping, piping components, piping elements, and ductwork exposed to an indoor air external or outdoor air external environment in the Emergency Diesel Generator and Auxiliary System, Chlorination System, and Control Room HVAC System. The Structures Monitoring Program relies on periodic visual inspections by qualified individuals to identify and evaluate the degradation of piping, piping components, and piping elements to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

Oyster Creek will implement a Periodic Inspection Program, B.2.5, to manage the loss of material in steel Emergency Diesel Generator exhaust piping, piping components, and piping elements exposed to a diesel exhaust environment. The Periodic Inspection Program includes periodic condition monitoring examinations to assure that existing environmental conditions are not resulting in material degradation that could result in the loss of system intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection Program is described in Appendix B.

At Oyster Creek, the aging effect of loss of material due to general corrosion in the Primary Containment atmosphere is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. Therefore, there is no loss of material for carbon steel components exposed to a containment nitrogen environment because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. This conclusion is supported by past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1).

3.3.2.2.8 <u>Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (BWR/PWR)</u>

1. Loss of material due to general, pitting, and crevice corrosion and MIC could occur for steel (with or without coating or wrapping) piping, piping components, and piping elements exposed to soil. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general, pitting, and crevice corrosion and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

   Oyster Creek will implement a Buried Piping Inspection program, B.1.26, to manage the loss of material in steel piping, piping components, and piping elements exposed to soil in the Service Water System, Emergency Service Water System, Fire Protection System, Drywell Floor and Equipment Drain System, Miscellaneous Floor and Equipment Drain System, Spent Fuel Pool Cooling System, Reactor Building Closed Cooling Water System, and Roof Drains and Overboard Discharge System. The Buried Piping Inspection program includes preventive measures to mitigate corrosion and periodic inspection to manage the effects of corrosion on the pressure-retaining capacity of buried steel piping, piping components, and piping elements. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Buried Piping Inspection program is described in Appendix B.

   Oyster Creek will implement an Aboveground Outdoor Tanks program, B.1.21, to manage the loss of material from the bottom of outdoor steel tanks supported by earthen foundations in the Fire Protection System. The Aboveground Outdoor Tanks program provides for periodic internal UT inspections on the bottom of above ground outdoor steel tanks supported by earthen foundations. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Aboveground Outdoor Tanks program is described in Appendix B.

   Oyster Creek does not have any buried tanks within the scope of License Renewal.

2. Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion (MIC) could occur in the internal surfaces of steel ventilation system exposed to condensation. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

   At Oyster Creek, ventilation system components in the scope of license renewal are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal does not include condensation. This applies to the following ventilation systems: "C" Battery Room Heating and Ventilation System, 480V Switchgear Room Ventilation System, 4160V Switchgear Room Ventilation System, Battery and MG Set Room Ventilation System, Control Room HVAC System, Radwaste Area Heating and Ventilation System, and Reactor Building Ventilation System.

Oyster Creek will implement a Periodic Inspection Program, B.2.5, to manage the loss of material in non-ventilation system steel piping, piping components, and piping elements exposed to a condensation internal environment in the Containment Inerting System and the Emergency Diesel Generator and Auxiliary System. The Periodic Inspection Program includes periodic condition monitoring examinations to assure that existing environmental conditions are not resulting in material degradation that could result in the loss of system intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection Program is described in Appendix B.

3.3.2.2.9 Loss of Material Due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Fouling (BWR/PWR)

1. Loss of material due to general, pitting, and crevice corrosion, MIC, and fouling could occur in the internal surface of steel piping, piping components, piping elements, and tanks exposed to fuel oil. The existing aging management program relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709 and D2276 to manage loss of material due to corrosion or fouling. Corrosion or fouling may occur at locations where contaminants accumulate. The effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL report recommends further evaluation of programs to manage corrosion/fouling to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Fuel Oil Chemistry program, B.1.22, to manage the loss of material in steel piping, piping components, and piping elements exposed to a fuel oil internal environment in the Emergency Diesel Generator and Auxiliary System, Main Fuel Oil Storage & Transfer System, and Fire Protection System. The verification of the Fuel Oil Chemistry program to manage the loss of material in steel fuel oil tanks is implemented through the Fuel Oil Chemistry program tank inspection activities which requires that fuel oil tanks be periodically drained, cleaned, and internally inspected to ensure that corrosion is not occurring and that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Fuel Oil Chemistry and One-Time Inspection programs are described in Appendix B.

2. Loss of material due to general, pitting, crevice corrosion, MIC, and fouling could occur in steel heat exchanger shell side components exposed to lubricating oil. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in steel heat exchanger shell side components exposed to lubricating oil in the Emergency Diesel Generator and Auxiliary System, Reactor Water Cleanup System, and Reactor Recirculation System. The Lubricating Oil Monitoring Activities program manages physical and chemical properties of lubricating oil by sampling, testing, and trending to identify specific wear mechanisms, contamination, and oil degradation that could affect intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Lubricating Oil Monitoring Activities and One-Time Inspection programs are described in Appendix B.

3.3.2.2.10 <u>Loss of Material Due to Pitting and Crevice Corrosion (BWR/PWR)</u>

1. Loss of material due to pitting and crevice corrosion could occur in the stainless steel, steel with elastomer lining or stainless steel clad piping, piping components, and piping elements exposed to treated water or treated borated water. The water chemistry program relies on monitoring and control of reactor water chemistry based on EPRI guidelines of BWRVIP-29 (TR-103515) for water chemistry in BWRs, TR-105714 for primary water chemistry in PWRs to manage the effects of loss of material from pitting or crevice corrosion. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause pitting, or crevice corrosion. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL report recommends further evaluation of programs to manage loss of material from pitting and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in stainless steel or elastomer lined steel piping, piping components, piping elements, and heat exchanger tube side components exposed to a treated water environment in the Control Rod Drive System, Post-Accident Sampling System, Process Sampling System, Reactor Building Closed Cooling Water System, Reactor Water Cleanup System, Shutdown Cooling System, Spent Fuel Pool Cooling System, Standby Liquid Control System (Liquid Poison System), Water Treatment & Distribution System, Reactor Head Cooling System, and in the Primary Containment. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in stainless steel fuel storage and handling equipment and structures exposed to a treated water environment in the Fuel Storage and Handling Equipment System, and, to manage the loss of material in the stainless steel fuel pool skimmer surge tank liner exposed to a treated water environment in the Reactor Building Structure. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

When applied to stainless steel ASME Class MC Components in a treated water environment and to stainless steel ASME Class 2 and 3 Piping and Components in a treated water environment, Oyster Creek will use ASME Section XI, Subsection IWF, B.1.28, to verify the effectiveness of the Water Chemistry Program, B.1.2, to mitigate loss of material. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and ASME Section XI, Subsection IWF programs are described in Appendix B.

2. Loss of material due to pitting and crevice corrosion could occur for stainless steel and copper alloy piping, piping components, piping elements, ducting, and component internal and external surfaces exposed to condensation (internal and external), treated water, waste water (untreated or treated water) and soil. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in stainless steel and copper alloy piping, piping components, and piping elements exposed to a treated water internal or external environment in the Heating & Process Steam System, Reactor Water Cleanup System, Noble Metals Monitoring System, and Control Rod Drive System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of Generator Stator Water Chemistry Activities program, B.2.3, to manage the loss of material in stainless steel piping exposed to a treated water internal environment in the Main Generator and Auxiliary System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. Generator Stator Water Chemistry Activities and One-Time Inspection programs are described in Appendix B.

Oyster Creek will implement a One-Time Inspection program, B.1.24, to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a condensation internal environment in the Hydrogen & Oxygen Monitoring System and Nitrogen Supply System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The One-Time Inspection program is described in Appendix B.

Oyster Creek will implement a Periodic Inspection of Ventilation Systems program, B.2.4, to manage the loss of material in copper heat exchanger coils exposed to an indoor air/condensation external environment in the Control Room HVAC System. The program will inspect the external surfaces of ventilation system components to identify and assess aging effects that may be occurring. The program will include surface inspections of copper alloy components for indications of loss of material. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection of Ventilation Systems program is described in Appendix B.

Oyster Creek will implement an Aboveground Outdoor Tanks program, B.1.21, to manage the loss of material in outdoor Fire Protection System stainless steel tank components exposed to an outdoor air/condensation external environment. The Aboveground Outdoor Tanks program provides for periodic visual inspection of above ground tanks to detect degradation that could result in the loss of tank intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Aboveground Outdoor Tanks program is described in Appendix B.

3.3.2.2.11 Loss of Material Due to Pitting, Crevice, and Galvanic Corrosion (BWR/PWR)

Pitting, crevice, and galvanic corrosion can occur for copper alloy piping, piping components, and piping elements exposed to lubricating oil. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in copper alloy piping, piping components, piping elements, and heat exchangers exposed to a lubricating oil environment in the Service Water System, Reactor Water Cleanup System, Emergency Diesel Generator and Auxiliary System, and Fire Protection System. The Lubricating Oil Monitoring Activities program manages physical and chemical properties of lubricating oil by sampling, testing, and trending to identify specific wear mechanisms, contamination, and oil degradation that could affect intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Lubricating Oil Monitoring Activities and One-Time Inspection programs are described in Appendix B

3.3.2.2.12 Loss of Material due to Pitting, Crevice, and Microbiologically Influenced Corrosion (BWR/PWR)

1. Loss of material due to pitting, crevice and microbiologically influenced corrosion could occur in aluminum piping, piping components, and piping elements exposed to fuel oil and for copper alloy piping, piping components, and piping elements exposed to fuel oil with water as a contaminant. The existing aging management program relies on the fuel oil chemistry program for monitoring and control of fuel oil contamination in accordance with the guidelines of ASTM Standards D4057, D1796, D2709 and D2276 to manage loss of material due to corrosion. Corrosion may occur at locations where contaminants accumulate. The effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL report recommends further evaluation of programs to manage corrosion to verify the effectiveness of the program. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Fuel Oil Chemistry program, B.1.22, to manage the loss of material in aluminum and copper alloy piping, piping components, and piping elements exposed to a fuel oil environment in the Emergency Diesel Generator and Auxiliary System, Main Fuel Oil Storage & Transfer System, and Fire Protection System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Fuel Oil Chemistry and One-Time Inspection programs are described in Appendix B.

2. Loss of material due to pitting, crevice and microbiologically influenced corrosion could occur in stainless steel piping, piping components, and piping elements exposed to lubricating oil. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a lubricating oil environment in the Emergency Diesel Generator and Auxiliary System. The Lubricating Oil Monitoring Activities program manages physical and chemical properties of lubricating oil by sampling, testing, and trending to identify specific wear mechanisms, contamination, and oil degradation that could affect intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Lubricating Oil Monitoring Activities and One-Time Inspection programs are described in Appendix B.

3.3.2.2.13 Loss of Material Due to Wear (BWR/PWR)

Loss of material due to wear could occur in the elastomer collars and seals of the ducts in the ventilation systems. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

Oyster Creek will implement a Periodic Inspection of Ventilation Systems program, B.2.4, for the inspection of elastomer door seals exposed to an indoor air internal or external environment in the “C” Battery Room Heating and Ventilation System, 480V Switchgear Room Ventilation System, Battery and MG Set Room Ventilation System, Control Room HVAC System, Radwaste Area Heating and Ventilation System, Reactor Building Ventilation System, and Standby Gas Treatment System. Periodic inspections are performed on elastomer door seals to identify detrimental changes in material properties, as evidenced by cracking, perforations in the material, or leakage. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Periodic Inspection of Ventilation Systems program is described in Appendix B.

3.3.2.2.14 Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion (BWR/PWR)

Reduction of neutron-absorbing capacity and loss of material due to general corrosion could occur in the neutron-absorbing sheets of the spent fuel storage rack in the spent fuel storage. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

At Oyster Creek, the aging effects of the Boral Spent Fuel Storage Racks exposed to a treated water environment are insignificant and require no aging management. The potential aging effects resulting from sustained irradiation of Boral were previously evaluated by the staff (BNL-NUREG-25582, dated January 1979; NUREG-1787, VC Summer SER, paragraph 3.5.2.4.2) and determined to be insignificant. Oyster Creek installed four (4) spent fuel storage racks, manufactured by HOLTEC International, that utilized Boral neutron absorbing material, in year 2000. The Boral coupons kept inside the spent fuel storage pool were removed and inspected in 2002, and again in

2004. Inspection results showed no blisters, pits, dimensional changes, or other age related degradations. Neutron transmission tests on the irradiated coupon showed that average Boron-10 areal density in the irradiated coupon is 0.0209 grams/cm2, which means, within the experimental accuracy, Boron-10 has not been lost from the coupons. Plant operating experience is therefore consistent with the staff's previous conclusion and an aging management program is not required.

3.3.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Auxiliary Systems components:

- Section 4.3, Metal Fatigue Analysis

3.3.3 CONCLUSION

The Auxiliary Systems piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Auxiliary Systems components are identified in the summaries in Section 3.3.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Auxiliary Systems components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-1	Steel cranes - structural girders exposed to air – indoor uncontrolled (external)	Cumulative fatigue damage	TLAA to be evaluated for structural girders of cranes. See the Standard Review Plan, Section 4.7 for generic guidance for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.3.2.2.1.
3.3.1-2	Piping, piping components, piping elements, and heat exchanger shell side components including tubes	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.3.2.2.1.
3.3.1-3	PWR Only				

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-4	Stainless steel piping, piping components, and piping elements exposed to sodium pentaborate solution	Cracking due to stress corrosion cracking	Water Chemistry for BWR. The AMP is to be augmented by verifying the effectiveness of water chemistry control. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage SCC of stainless steel exposed to a sodium pentaborate environment. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry program implementation. See subsection 3.3.2.2.3.1.
3.3.1-5	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	Not applicable. See subsection 3.3.2.2.3.2.
3.3.1-6	Stainless steel and stainless clad steel piping, piping components, piping elements, heat exchanger shell and tube side components (including tubes) exposed to treated or closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage SCC of stainless steel heat exchanger shell and tube side components exposed to a treated water environment >140°F. See subsection 3.3.2.2.3.2.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-7	High-strength steel closure bolting exposed to air with steam or water leakage.	Cracking due to stress corrosion cracking, cyclic loading	Plant specific	Yes, plant specific	The Bolting Integrity program, B.1.12, applies to the Control Rod Drive System ASME Class 1 high-strength steel closure bolting. Bolting integrity management follows published EPRI guidelines and other industry recommendations for material selection and testing, inservice inspection (ISI), and plant surveillance and maintenance practices. See subsection 3.3.2.2.4.1.
3.3.1-8	PWR Only				
3.3.1-9	PWR Only				
3.3.1-10	Elastomer seals and components exposed to air – indoor uncontrolled >35°C (>95°F) (Internal) or air – indoor uncontrolled (External)	Hardening and loss of strength due to elastomer degradation	Plant specific	Yes, plant specific	The Periodic Inspection of Ventilation Systems program, B.2.4, will be used to inspect the internal and external surfaces of elastomer seals and components exposed to an indoor air (internal/external) environment associated with plant ventilation systems. The Structures Monitoring Program, B.1.31, will be used to inspect the external surfaces of elastomer components exposed to an indoor air (external) environment associated with miscellaneous plant Auxiliary Systems. See subsection 3.3.2.2.5.1.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-11	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	The internal inspections of expansion joint and flexible connection elastomers exposed to a treated water internal environment in miscellaneous plant Auxiliary Systems are included in the Periodic Inspection Program, B.2.5. See subsection 3.3.2.2.5.2.
3.3.1-12	Steel piping, bolting, and component external surfaces air – indoor uncontrolled (external), air – outdoor (external), or condensation (external)	Loss of material due to general corrosion	Plant specific	Yes, plant specific	The Fire Protection program, B.1.19, will be used to inspect the internal and external surfaces of steel piping, piping components, and piping elements exposed to an indoor air (internal/external) or outdoor air (external) environment for halon/carbon dioxide fire suppression systems. The Fire Water System program, B.1.20, will be used to inspect the external surfaces of steel piping, piping components, and piping elements exposed to an indoor air (external) or outdoor air (external) environment for water-based fire protection systems. The Periodic Inspection of Ventilation Systems program, B.2.4, will be used to inspect the internal and external surfaces of steel piping, piping components, piping elements, and ventilation equipment exposed to an indoor air (internal/external) or an outdoor air (external) environment for ventilation systems. The Structures Monitoring Program, B.1.31, will be used to inspect the external surfaces of steel piping, piping components, and piping elements

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
					exposed to an indoor air (external) or outdoor air (external) environment for all other Auxiliary Systems. See subsection 3.3.2.2.6.
3.3.1-13	Steel reactor coolant pump oil collection system piping, tubing, valve bodies, and tank exposed to lubricating oil	Loss of material due to general, pitting and crevice corrosion	A plant specific aging management program that determines the thickness of the lower portion of the tank is to be evaluated. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	Not applicable. See subsection 3.3.2.2.7.1.
3.3.1-14	Steel reactor coolant pump oil collection system piping, tubing, valve bodies, and tank exposed to lubricating oil	Loss of material due to general, pitting and crevice corrosion	A plant specific aging management program that monitors the degradation of the components is to be evaluated. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	Not applicable. See subsection 3.3.2.2.7.1.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-15	Steel and aluminum piping, piping components, and piping elements exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry. The AMP is to be augmented by verifying the effectiveness of water chemistry control. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in steel and aluminum piping, piping components, and piping elements, in aluminum Fuel Pool Gates, and in aluminum fuel storage and handling equipment and structures, exposed to a treated water environment. When applied to steel ASME Class MC, Class 2, and Class 3 component supports in a treated water environment, ASME Section XI, Subsection IWF, B.1.28, is used to verify the effectiveness of the Water Chemistry Program to mitigate loss of material. See subsection 3.3.2.2.7.2.
3.3.1-16	Steel piping, ducting, closure bolting, and heat exchanger tubes exposed to air – indoor uncontrolled (internal or external), air -outdoor (external), condensation (internal), moist air, treated water, lubricating oil, or diesel exhaust	Loss of material due to general, pitting and crevice corrosion	Plant specific	Yes, detection of aging effects is to be evaluated	The 10 CFR Part 50, Appendix J program, B.1.29, Fire Protection program, B.1.19, Fire Water System program, B.1.20, Generator Stator Water Chemistry Activities program, B.2.3, Lubricating Oil Monitoring Activities program, B.2.2, One-Time Inspection program, B.1.24, Periodic Inspection of Ventilation Systems program, B.2.4, Periodic Inspection Program, B.2.5, and Structures Monitoring Program, B.1.31, will be used to manage the loss of material in steel piping, piping components, piping elements, ducting, and heat exchangers exposed to indoor air (internal/external), outdoor air (external), treated water (internal), and lubricating oil (internal/external) environments. See subsection 3.3.2.2.7.3.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-17	Steel piping, ducting, closure bolting, and heat exchanger tubes exposed to air – indoor uncontrolled (internal or external), air -outdoor (external), condensation (internal), moist air, treated water, lubricating oil, or diesel exhaust	Loss of material/ general (steel only), pitting and crevice corrosion	Plant specific	Yes, detection of aging effects is to be evaluated	The Periodic Inspection Program, B.2.5, will be used to manage the loss of material in steel Emergency Diesel Generator and Auxiliary System exhaust piping, piping components, and piping elements exposed to a diesel exhaust environment. See subsection 3.3.2.2.7.3.
3.3.1-18	Steel (with or without coating or wrapping) piping, piping components, and piping elements exposed to soil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	Yes, detection of aging effects and operating experience are to be further evaluated	The Buried Piping Inspection Program, B.1.26, will be used to manage the loss of material in steel piping, piping components, and piping elements exposed to soil. The Aboveground Outdoor Tanks program, B.1.21, will be used to manage the loss of material from the bottom of outdoor steel tanks supported by earthen foundations. See subsection 3.3.2.2.8.1
3.3.1-19	Steel ducting and components internal surfaces exposed to condensation (internal)	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Plant specific	Yes, plant specific	The Periodic Inspection Program, B.2.5, will be used to manage the loss of material in steel piping, piping components, and piping elements exposed to a condensation (internal) environment. See subsection 3.3.2.2.8.2.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-20	Steel piping, piping components, piping elements, and tanks exposed to fuel oil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Fuel Oil Chemistry. The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Fuel Oil Chemistry program, B.1.22, to manage the loss of material in steel piping, piping components, and piping elements exposed to fuel oil. Fuel Oil Chemistry program tank inspection activities verify the effectiveness of the Fuel Oil Chemistry program to manage the loss of material in steel fuel oil tanks. Exceptions apply to the NUREG-1801 recommendations for Fuel Oil Chemistry program implementation. See subsection 3.3.2.2.9.1.
3.3.1-21	Steel heat exchanger shell side components exposed to lubricating oil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in steel heat exchanger shell side components exposed to lubricating oil. See subsection 3.3.2.2.9.2.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-22	Stainless steel or steel with elastomer lining or stainless steel cladding piping, piping components, and piping elements exposed to treated water or treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry. The AMP is to be augmented by verifying the effectiveness of water chemistry control. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in stainless steel or elastomer lined steel piping, piping components, piping elements, heat exchanger tube side components, fuel pool skimmer surge tank liner, and Fuel Storage and Handling Equipment exposed to a treated water environment. When applied to stainless steel ASME Class MC, Class 2, and Class 3 component supports in a treated water environment, ASME Section XI, Subsection IWF, B.1.28, is used to verify the effectiveness of the Water Chemistry Program to mitigate loss of material. See subsection 3.3.2.2.10.1.
3.3.1-23	Stainless steel and copper alloy piping, piping components, piping elements, ducting, and component internal and external surfaces exposed to condensation (internal and external), treated water, waste water (untreated or treated water) and soil	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, detection of aging effects is to be evaluated	Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in stainless steel and copper alloy piping, piping components, and piping elements exposed to a treated water (internal/external) environment. Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Generator Stator Water Chemistry Activities program, B.2.3, to manage the loss of material in stainless steel piping exposed to a treated water (internal) environment in the Main Generator and Auxiliary System. Oyster Creek will implement a One-Time Inspection program, B.1.24, to manage

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
					the loss of material in stainless steel piping, piping components, and piping elements exposed to a condensation (internal) environment. Oyster Creek will implement a Periodic Inspection of Ventilation Systems program, B.2.4, to manage the loss of material in copper heat exchanger coils exposed to an indoor air/condensation (external) environment. Oyster Creek will implement an Aboveground Outdoor Tanks program, B.1.21, to manage the loss of material in outdoor Fire Protection System stainless steel tank components exposed to an outdoor air/condensation (external) environment. See subsection 3.3.2.2.10.2.
3.3.1-24	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting, crevice, and galvanic corrosion	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in copper alloy piping, piping components, piping elements, and heat exchangers exposed to a lubricating oil environment. See subsection 3.3.2.2.11.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-25	Aluminum piping, piping components, and piping elements exposed to fuel oil; Copper alloy piping, piping components, and piping elements exposed to fuel oil (water as a contaminant)	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Fuel Oil Chemistry. The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Fuel Oil Chemistry program, B.1.22, to manage the loss of material in aluminum piping, piping components, and piping elements exposed to fuel oil. Exceptions apply to the NUREG-1801 recommendations for Fuel Oil Chemistry program implementation. See subsection 3.3.2.2.12.1.
3.3.1-26	Aluminum piping, piping components, and piping elements exposed to fuel oil; Copper alloy piping, piping components, and piping elements exposed to fuel oil (water as a contaminant)	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Fuel Oil Chemistry. The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See One-Time Inspection for an acceptable verification program.	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801 with exceptions. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Fuel Oil Chemistry program, B.1.22, to manage the loss of material in copper alloy piping, piping components, and piping elements exposed to fuel oil. Exceptions apply to the NUREG-1801 recommendations for Fuel Oil Chemistry program implementation. See subsection 3.3.2.2.12.1.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-27	Stainless steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to lubricating oil. See subsection 3.3.2.2.12.2.
3.3.1-28	Elastomer seals and components exposed to air – indoor uncontrolled (internal and external)	Loss of material due to wear	Plant specific	Yes, plant specific	The Periodic Inspection of Ventilation Systems program, B.2.4, will be used to inspect elastomer door seals exposed to an indoor air (internal/external) environment associated with plant ventilation systems. See subsection 3.3.2.2.13.
3.3.1-29	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	The aging effects of Boral exposed to a treated water environment are insignificant and require no aging management. See subsection 3.3.2.2.14.
3.3.1-30	Boraflex spent fuel storage racks neutron-absorbing sheets exposed to treated water or treated borated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Boraflex Monitoring	No	Consistent with NUREG-1801 with exceptions. The Boraflex Rack Management Program, B.1.15, will be used to manage the aging effects of boraflex spent fuel storage racks exposed to a treated water environment. Exceptions apply to the NUREG-1801 recommendations for Boraflex Rack Management Program implementation.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-31	Stainless steel and cast austenitic stainless steel piping, piping components, and piping elements exposed to treated water >60°C (>140°F)	Cracking due to Stress corrosion cracking, intergranular stress corrosion cracking	BWR Reactor Water Cleanup System	No	The BWR Reactor Water Cleanup System program, B.1.18, will be used to manage stress corrosion cracking in stainless steel Reactor Water Cleanup System piping exposed to treated water > 140°F for piping ≥ 4” nominal pipe size. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage stress corrosion cracking in stainless steel Reactor Water Cleanup System and Noble Metals Monitoring System piping exposed to treated water > 140°F for piping < 4” nominal pipe size.
3.3.1-32	Stainless steel and cast austenitic stainless steel piping, piping components, and piping elements exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	BWR Stress Corrosion Cracking and Water Chemistry for BWR	No	Not applicable. Oyster Creek has no stainless steel Non-RCPB Shutdown Cooling System piping exposed to treated water > 140°F. The RCPB portion of the Shutdown Cooling System is discussed in Section 3.1.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-33	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	Consistent with NUREG-1801 with exceptions. The Aboveground Outdoor Tanks program, B.1.21, will be used to manage the loss of material in aboveground steel tanks exposed to an outdoor air (external) environment in the Fire Protection System, Emergency Diesel Generator and Auxiliary System, and Nitrogen Supply System. Exceptions apply to the NUREG-1801 recommendations for Aboveground Outdoor Tanks program implementation.
3.3.1-34	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	Not applicable. Auxiliary System high-strength steel closure bolting exposed to air with steam or water leakage applies only to the Control Rod Drive System. Control Rod Drive System high-strength steel closure bolting is evaluated in Item Number 3.3.1-7.
3.3.1-35	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of material due to general, pitting and crevice corrosion, loss of preload due to stress relaxation	Bolting Integrity	No	Except as discussed below, the Bolting Integrity program, B.1.12, will be used to manage the loss of material and loss of preload in steel closure bolting exposed to an indoor air/containment atmosphere (external) environment in Auxiliary Systems. The ASME Section XI, Subsection IWE program, B.1.27, will be used to manage the loss of material and loss of preload in steel closure bolting exposed to an indoor air (external) environment in the Containment Vacuum

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
					Breakers System. The Structures Monitoring program, B.1.31, will be used to manage the loss of material and loss of preload in steel structural bolting exposed to an indoor air/containment atmosphere (external) environment in Buildings/Structures, and, will be used to manage the loss of material in steel closure bolting exposed to an indoor air (external) environment in ventilation systems. The Inspection of Overhead Heavy Load and Light Load (Related to Fuel handling) Handling Systems program, B.1.16, will be used to manage the loss of material and loss of preload in steel structural bolting exposed to an indoor air (external) environment in the Fuel Storage and Handling Equipment System and Cranes and Hoists System.
3.3.1-36	Steel bolting exposed to air – outdoor (external)	Loss of material due to general, pitting and crevice corrosion	Bolting Integrity	No	Except as discussed below, the Bolting Integrity program, B.1.12, will be used to manage the loss of material in steel closure bolting exposed to an outdoor air (external) environment in Auxiliary Systems. The Inspection of Overhead Heavy Load and Light Load (Related to Fuel handling) Handling Systems program, B.1.16, will be used to manage the loss of material in steel structural bolting exposed to an outdoor air (external) environment in the Cranes and Hoists System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
					The Structures Monitoring program, B.1.31, will be used to manage the loss of material in steel structural bolting exposed to an outdoor air (external) environment in Buildings and Structures, and, in steel closure bolting exposed to an outdoor air (external) environment in ventilation systems.
3.3.1-37	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	Not applicable. Except for Control Rod Drive System high-strength steel closure bolting which is evaluated in Item Number 3.3.1-7, Auxiliary System steel closure bolting is not exposed to air with steam or water leakage.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-38	Copper alloy piping, piping components, piping elements, and heat exchanger tubes exposed to treated and closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	The Closed Cycle Cooling Water Program, B.1.14, will be used to manage the loss of material in copper alloy piping, piping components, piping elements, and heat exchangers exposed to a closed cycle cooling water environment in the Emergency Diesel Generator and Auxiliary System, Process Sampling System, Reactor Building Closed Cooling Water System, and Turbine Building Closed Cooling Water System. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in copper alloy piping, piping components, and piping elements exposed to a treated water environment in the Reactor Building Closed Cooling Water System and Condensate Transfer System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-39	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 Closed Cycle Cooling Water program, B.1.14, will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a closed cycle cooling water environment in the Emergency Diesel Generator and Auxiliary System, Process Sampling System, Reactor Building Closed Cooling Water System, and Turbine Building Closed Cooling Water System. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Closed Cycle Cooling Water Program to manage the loss of material in stagnant flow areas.
3.3.1-40	Stainless steel heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exceptions. The Closed Cycle Cooling Water program, B.1.14, will be used to manage the reduction of heat transfer in stainless steel heat exchanger tubes and plates exposed to a closed cycle cooling water environment in the Reactor Building Closed Cooling Water System. Exceptions apply to the NUREG-1801 recommendations for Closed-Cycle Cooling Water System program implementation.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-41	Stainless steel; steel with stainless steel cladding heat exchanger shell side components including tubes exposed to closed cycle cooling water	Loss of material due to microbiologically influenced corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exceptions. The Closed Cycle Cooling Water program, B.1.14, will be used to manage the loss of material in stainless steel heat exchanger/cooler shell side components, tubes, plates, and nozzles exposed to a closed cycle cooling water environment in the Reactor Building Closed Cooling Water System and Turbine Building Closed Cooling Water System. Exceptions apply to the NUREG-1801 recommendations for Closed-Cycle Cooling Water System program implementation.
3.3.1-42	Steel piping, piping components, piping elements, tanks, and heat exchanger shell side components exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	The Closed Cycle Cooling Water program, B.1.14, will be used to manage the loss of material in steel piping, piping components, piping elements, tanks, and heat exchanger/cooler shell side components, tubes, covers, and nozzles exposed to a closed cycle cooling water environment in the Emergency Diesel Generator and Auxiliary System, Process Sampling System, Reactor Building Closed Cooling Water System, Service Water System, and Turbine Building Closed Cooling Water System. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Closed Cycle Cooling Water Program to manage the loss of material in stagnant flow areas.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-43	Gray cast iron piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion, and selective leaching	Closed-Cycle Cooling Water System and Selective Leaching of Materials	No	The Closed Cycle Cooling Water program, B.1.14, and the Selective Leaching of Materials program, B.1.25, will be used to manage the loss of material in cast iron piping, piping components, piping elements, and cooler tube side components exposed to a closed cycle cooling water environment in the Reactor Building Closed Cooling Water System and Turbine Building Closed Cooling Water System. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Closed Cycle Cooling Water program and Selective Leaching of Materials program to manage the loss of material in stagnant flow areas.
3.3.1-44	Steel compressed air system closure bolting exposed to condensation	Loss of material due to general, pitting and crevice corrosion	Compressed Air Monitoring	No	Not applicable. Instrument (Control) Air System steel closure bolting is not exposed to condensation. Instrument (Control) Air System steel closure bolting exposed to an indoor air (external) environment is discussed in Item Number 3.3.1-35.
3.3.1-45	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	Not applicable. Instrument (Control) Air System piping, piping components, and piping elements are not exposed to a condensation (internal) environment. Instrument (Control) Air System piping, piping components, and piping elements exposed to a dry gas (internal) environment are discussed in Item Number 3.3.1-79 and 3.3.1-80.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-46	Elastomer fire barrier penetration seals exposed to air – outdoor or indoor uncontrolled	Increased elastomer hardness, shrinkage and loss of strength due to weathering	Fire Protection	No	The Fire Protection program, B.1.19, will be used to manage the change in material properties of elastomer fire barriers exposed to an indoor air environment in the Fire Protection System. The Structures Monitoring program, B.1.31, will be used to manage the change in material properties of elastomer expansion joints and enclosure boots exposed to an indoor or outdoor air environment in the Service Water System, Emergency Service Water System, and Hardened Vent System, and, in elastomer seals and penetration seals exposed to an indoor or outdoor air environment in Buildings and Structures.
3.3.1-47	Steel fire rated doors exposed to air – outdoor or indoor uncontrolled	Loss of material due to wear	Fire Protection	No	Consistent with NUREG-1801 with exceptions. The Fire Protection program, B.1.19, will be used to manage the loss of material in steel fire doors exposed to an indoor or outdoor air environment. Exceptions apply to the NUREG-1801 recommendations for Fire Protection program implementation.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-48	Steel piping, piping components, and piping elements exposed to fuel oil	Loss of material due to general, pitting and crevice corrosion	Fire Protection and Fuel Oil Chemistry	No	Consistent with NUREG-1801 with exceptions. The Fire Protection program, B.1.19, and the Fuel Oil Chemistry program, B.1.22, will be used to manage the loss of material in steel piping, piping components, and piping elements exposed to a fuel oil environment in the Fire Protection System. Exceptions apply to the NUREG-1801 recommendations for Fire Protection program and Fuel Oil Chemistry program implementation.
3.3.1-49	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor or indoor uncontrolled	Concrete cracking and spalling due to freeze thaw, aggressive chemical attack, and reaction with aggregates	Fire Protection and Structures Monitoring Program	No	Consistent with NUREG-1801 with exceptions. The Fire Protection program, B.1.19, and the Structures Monitoring Program, B.1.31, will be used to manage cracking in concrete fire barrier walls and slabs exposed to an indoor or outdoor air environment. Exceptions apply to the NUREG-1801 recommendations for Fire Protection program implementation.
3.3.1-50	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor or indoor uncontrolled	Loss of material due to corrosion of embedded steel	Fire Protection and Structures Monitoring Program	No	Consistent with NUREG-1801 with exceptions. The Fire Protection program, B.1.19, and the Structures Monitoring Program, B.1.31, will be used to manage loss of material in concrete fire barrier walls and slabs exposed to an indoor or outdoor air environment. Exceptions apply to the NUREG-1801 recommendations for Fire Protection program implementation.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-51	Copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System	No	Consistent with NUREG-1801. The Fire Water System program, B.1.20, will be used to manage the loss of material in copper alloy piping, piping components, and piping elements exposed to a raw water environment in the Fire Protection System.
3.3.1-52	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 Fire Water System program, B.1.20, will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a raw water environment in the Fire Protection System.
3.3.1-53	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System	No	Consistent with NUREG-1801. The Fire Water System program, B.1.20, will be used to manage the loss of material in steel piping, piping components, and piping elements exposed to a raw water environment in the Fire Protection System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-54	Stainless steel piping, piping components, and piping elements exposed to fuel oil	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Fuel Oil Chemistry	No	Consistent with NUREG-1801 with exceptions. The Fuel Oil Chemistry program, B.1.22, will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a fuel oil environment in the Emergency Diesel Generator and Auxiliary System and Main Fuel Oil Storage & Transfer System. Exceptions apply to the NUREG-1801 recommendations for Fuel Oil Chemistry program implementation.
3.3.1-55	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 with exceptions. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program, B.1.16, will be used to manage the loss of material in steel rail systems, jib cranes, monorails and hoists, and cranes structural components exposed to an indoor air (external) environment in the Cranes and Hoists System. Exceptions apply to the NUREG-1801 recommendations for Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program implementation.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-56	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 with exceptions. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program, B.1.16, will be used to manage the loss of material in steel crane rail systems exposed to an indoor air (external) environment in the Cranes and Hoists System. Exceptions apply to the NUREG-1801 recommendations for Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program implementation.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-57	Copper alloy piping, piping components, piping elements, and heat exchanger components (including tubes) exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	The Open Cycle Cooling Water program, B.1.13, will be used to manage the loss of material in copper alloy piping, piping components, piping elements and heat exchanger tube side components exposed to a raw water – salt water environment in the Emergency Service Water System, Roof Drains and Overboard Discharge System, and Service Water System. The Periodic Inspection Program, B.2.5, will be used to manage the loss of material in copper alloy piping, piping components, and piping elements exposed to a raw water – salt water environment in the Circulating Water System. The Fire Water System program, B.1.20, will be used to manage the loss of material in copper alloy heat exchanger shell and tube side components exposed to a raw water – fresh water environment in the Fire Protection System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-58	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Open-Cycle Cooling Water System	No	The Open Cycle Cooling Water program, B.1.13, will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a raw water – salt water environment in the Emergency Service Water System and Service Water System. The Periodic Inspection Program, B.2.5, will be used to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a raw water – salt water environment in the Circulating Water System.
3.3.1-59	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Open-Cycle Cooling Water System	No	Not applicable. There are no in-scope steel or copper alloy piping, piping components, and piping elements exposed to raw water in the Oyster Creek Emergency Diesel Generator and Auxiliary system. The diesels are cooled by radiators in a closed cooling water system.
3.3.1-60	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	The Fire Water System program, B.1.20, will be used to manage the reduction of heat transfer in copper alloy heat exchanger tubes exposed to a raw water – fresh water environment in the Fire Protection System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-61	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	The Open Cycle Cooling Water program, B.1.13, will be used to manage the loss of material in nickel alloy piping components and piping elements exposed to a raw water – salt water environment in the Emergency Service Water System. The One-Time Inspection program, B.1.24, will be used to manage the loss of material in stainless steel piping exposed to a raw water – fresh water environment in the Reactor Building Floor and Equipment Drains System.
3.3.1-62	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Open-Cycle Cooling Water System	No	The Structures Monitoring Program, B.1.31, will be used to manage the loss of material in galvanized steel trash racks exposed to a standing water environment in the Intake Structure and Canal Structure. The One-Time Inspection program, B.1.24, will be used to manage the loss of material in cast iron piping exposed to a raw water – fresh water environment in the Sanitary Waste System.
3.3.1-63	Steel piping, piping components, and piping elements (without lining/coating or with degraded lining/coating) and heat exchanger tube side components	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	The Open Cycle Cooling Water program, B.1.13, will be used to manage the loss of material in steel piping, piping components, piping elements, and heat exchanger tube side components exposed to a raw water – salt water environment in the Chlorination System, Roof Drains and Overboard Discharge System, Service Water

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
	(including tubes) exposed to raw water				System, and Emergency Service Water System. The Periodic Inspection Program, B.2.5, will be used to manage the loss of material in steel piping, piping components, and piping elements exposed to a raw water – salt water environment in the Circulating Water System. The One-Time Inspection program, B.1.24, will be used to manage the loss of material in steel piping, piping components, and piping elements exposed to a raw water – fresh water environment in the Reactor Building Floor and Equipment Drains System and in the Miscellaneous Floor and Equipment Drain System.
3.3.1-64	Steel piping, piping components, and piping elements with internal lining or coating exposed to raw water	Loss of material due to lining or coating degradation	Open-Cycle Cooling Water System	No	Not applicable. The presence of internal linings for corrosion protection is conservatively not credited. Degradation of internal coatings can contribute to potential downstream flow blockage. However NUREG-1801 Table IX.F under the aging mechanism of “fouling” states that reduction of system flow rate is considered active and thus not in the purview of license renewal. Therefore credit is not being taken for internal coating inspections.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-65	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger tube side components (including tubes) exposed to raw water, treated water, or closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801. The Selective Leaching of Materials program, B.1.25, will be used to manage the loss of material in copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger/cooler tube side components exposed to a closed cycle cooling water, raw water – salt water, raw water – fresh water, and treated water environment in the Circulating Water System, Condensate Transfer System, Control Rod Drive System, Emergency Diesel Generator and Auxiliary System, Emergency Service Water System, Fire Protection System, Heating & Process Steam System, Reactor Building Closed Cooling Water System, Reactor Water Cleanup System, Service Water System, Turbine Building Closed Cooling Water System, and Water Treatment & Distribution System.
3.3.1-66	Gray cast iron piping, piping components, and piping elements exposed to soil, raw water, treated water, or untreated water	Loss of material due to selective leaching and general corrosion	Selective Leaching of Materials	No	Consistent with NUREG-1801. The Selective Leaching of Materials program, B.1.25, will be used to manage the loss of material in cast iron piping components and piping elements exposed to a soil environment in the Fire Protection System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-67	Gray cast iron piping, piping components, and piping elements exposed to soil, raw water, treated water, or untreated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801. The Selective Leaching of Materials program, B.1.25, will be used to manage the loss of material in cast iron piping, piping components, and piping elements exposed to condensation, raw water – fresh water, raw water – salt water, and treated water environment in the Chlorination System, Circulating Water System, Containment Inerting System, Drywell Floor and Equipment Drains System, Fire Protection System, Miscellaneous Floor and Equipment Drain System, Reactor Building Floor and Equipment Drains System, Reactor Water Cleanup System, Sanitary Waste System, Service Water System, Spent Fuel Pool Cooling System, and Water Treatment & Distribution System.
3.3.1-68	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	The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems, B.1.16, will be used to manage the loss of material in the steel Refueling Platform exposed to an indoor air (external) environment in the Fuel Storage and Handling Equipment System.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-69	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry	No	Consistent with NUREG-1801 with exceptions. The Water Chemistry program, B.1.2, will be used to manage the reduction of heat transfer in stainless steel heat exchanger tubes and plates exposed to a treated water environment in the Reactor Building Closed Cooling Water System. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry program implementation.
3.3.1-70	Stainless steel spent fuel storage racks exposed to treated water or treated borated water, >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	Not applicable. Stainless steel spent fuel storage racks are exposed to a treated water <140°F environment and are not susceptible to cracking. The loss of material aging effect for spent fuel storage racks exposed to a treated water <140°F environment is evaluated in Item Number 3.3.1-22.
3.3.1-71	PWR Only				
3.3.1-72	PWR Only				
3.3.1-73	PWR Only				

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems					
Item Number	**Component**	**Aging Effect/Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-74	Galvanized steel piping, piping components, and piping elements exposed to air – indoor uncontrolled	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-75	Glass piping, piping components, and piping elements exposed to air, fuel oil, lubricating oil, raw water, treated water, and treated borated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-76	Stainless steel, cast austenitic 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.
3.3.1-77	Steel and aluminum piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	Not applicable. Indoor air controlled (external) environment is not used.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-78	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.3.1-79	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.
3.3.1-80	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to lubricating oil (no water pooling) or dried air	None	None	NA - No AEM or AMP	Steel, stainless steel, and copper alloy piping, piping components, and piping elements are exposed to a dry gas (internal) environment in the Instrument (Control) Air System. The Compressed Air Monitoring program, B.1.17, ensures that compressed air is sufficiently dry to preclude internal condensation in the Instrument (Control) Air System.
3.3.1-81	PWR Only				

Table 3.3.2.1.1
"C" Battery Room Heating & Ventilation
Summary of Aging Management Evaluation

Table 3.3.2.1.1 "C" Battery Room Heating & Ventilation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Filter	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 1
		Stainless Steel	Indoor Air (External)	None	None			G, 3
Damper housing	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
Door Seal	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-7 (A-36)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-8 (A-73)	3.3.1-28	E

Table 3.3.2.1.1 "C" Battery Room Heating & Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Door Seal	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-9 (A-18)	3.3.1-28	E
Ductwork	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
Fan Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-2 (A-08)	3.3.1-16	E
Filter Housing	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
Flexible Connection	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-7 (A-36)	3.3.1-10	E
			Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E

Table 3.3.2.1.1 "C" Battery Room Heating & Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
Louvers	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
Piping and fittings	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 2
		Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 2

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.
2. Ventilation system components in the scope of license renewal at Oyster Creek are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal is "Indoor Air (Internal)."
3. The aging effects for stainless steel ventilation closure bolting in an indoor environment is none. This is consistent with industry guidance.

Table 3.3.2.1.2
4160V Switchgear Room Ventilation
Summary of Aging Management Evaluation

Table 3.3.2.1.2 4160V Switchgear Room Ventilation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Filter	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 1
		Stainless Steel	Indoor Air (External)	None	None			G, 3
Damper housing	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
Fan Housing	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 2

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.
2. Ventilation system components in the scope of license renewal at Oyster Creek are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal is "Indoor Air (Internal)."
3. The aging effects for stainless steel ventilation closure bolting in an indoor environment is none. This is consistent with industry guidance.

Table 3.3.2.1.3
480V Switchgear Room Ventilation
Summary of Aging Management Evaluation

Table 3.3.2.1.3 480V Switchgear Room Ventilation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Filter	Aluminum	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Stainless Steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 2
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 2
		Stainless Steel	Indoor Air (External)	None	None			G, 3
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	A
Damper housing	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 1

Table 3.3.2.1.3 480V Switchgear Room Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper housing	Pressure Boundary	Aluminum	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Door Seal	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-7 (A-36)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-8 (A-73)	3.3.1-28	E
			Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-9 (A-18)	3.3.1-28	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G

Table 3.3.2.1.3 480V Switchgear Room Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Fan Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-2 (A-08)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.I-8 (A-78)	3.3.1-12	E
Filter Housing	Pressure Boundary	Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Flexible Connection	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
Louvers	Pressure Boundary	Aluminum	Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 1

Table 3.3.2.1.3 480V Switchgear Room Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Louvers	Pressure Boundary	Aluminum	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Piping and fittings	Pressure Boundary	Brass	Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
		Copper	Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Sensor Element	Pressure Boundary	Stainless Steel	Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	C, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Valve Body	Pressure Boundary	Brass	Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 1

Table 3.3.2.1.3 480V Switchgear Room Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Brass	Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Ventilation system components in the scope of license renewal at Oyster Creek are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal is "Indoor Air (Internal)."
2. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.
3. The aging effects for stainless steel ventilation closure bolting in an indoor environment is none. This is consistent with industry guidance.

Table 3.3.2.1.4
Battery and MG Set Room Ventilation
Summary of Aging Management Evaluation

Table 3.3.2.1.4 Battery and MG Set Room Ventilation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Filter	Aluminum	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 3
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 3
		Stainless Steel	Indoor Air (External)	None	None			G, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	A
Damper housing	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Table 3.3.2.1.4 Battery and MG Set Room Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Door Seal	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-9 (A-18)	3.3.1-28	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Ductwork	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Fan Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-2 (A-08)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.I-8 (A-78)	3.3.1-12	E
Filter Housing	Pressure Boundary	Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2

Table 3.3.2.1.4 Battery and MG Set Room Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter Housing	Pressure Boundary	Galvanized Steel	Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Flexible Connection	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
Flow Element (Pitot Tube)	Pressure Boundary	Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 2
Louvers	Pressure Boundary	Aluminum	Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 2
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Piping and fittings	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 2
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G

Table 3.3.2.1.4 Battery and MG Set Room Ventilation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 2
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Sensor Element (Temperature)	Pressure Boundary	Copper	Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 2
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Valve Body	Pressure Boundary	Brass	Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 2
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for stainless steel ventilation closure bolting in an indoor environment is none. This is consistent with industry guidance.
2. Ventilation system components in the scope of license renewal at Oyster Creek are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal is "Indoor Air (Internal)."
3. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.

Table 3.3.2.1.5
Chlorination System
Summary of Aging Management Evaluation

Table 3.3.2.1.5 Chlorination System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.H1-8 (A-24)	3.3.1-16	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
		Polypropylene	Outdoor Air (External)	None	None			F, 1

Table 3.3.2.1.5 Chlorination System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Polypropylene	Raw Water – Salt Water (Internal)	None	None			F, 1
		Polyvinyl Chloride (PVC, CPVC)	Outdoor Air (External)	None	None			F, 1
			Raw Water – Salt Water (Internal)	None	None			F, 1
Valve Body	Leakage Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.H1-8 (A-24)	3.3.1-16	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
		Polyvinyl Chloride (PVC, CPVC)	Outdoor Air (External)	None	None			F, 1
			Raw Water – Salt Water (Internal)	None	None			F, 1

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Polypropylene and Polyvinyl Chloride (PVC, CPVC) have no aging effects for identified environment based on industry standards.

Table 3.3.2.1.6
Circulating Water System
Summary of Aging Management Evaluation

Table 3.3.2.1.6 Circulating Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Expansion Joint	Leakage Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.F3-7 (A-36)	3.3.1-10	E
		Elastomer (Tube)	Raw Water – Salt Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)			G
Flow Glass	Leakage Boundary	Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 3

Table 3.3.2.1.6 Circulating Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Glass	Leakage Boundary	Copper Alloy	Raw Water – Salt Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Glass	Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Raw Water – Salt Water (Internal)	None	None	VII.J-13 (AP-50)	3.3.1-75	A
Flow Indicator	Leakage Boundary	Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 3
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
Level Glass	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-18 (A-32)	3.3.1-63	E, 3
		Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 3

Table 3.3.2.1.6 Circulating Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Level Glass	Leakage Boundary	Copper Alloy	Raw Water – Salt Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Glass	Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Raw Water – Salt Water (Internal)	None	None	VII.J-13 (AP-50)	3.3.1-75	A
Piping and fittings	Leakage Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 3
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A, 2
		Bronze	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 1, 3
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-18 (A-32)	3.3.1-63	E, 3

Table 3.3.2.1.6 Circulating Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 3
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-15 (A-54)	3.3.1-58	E, 3
Strainer Body	Leakage Boundary	Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 3
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
Thermowell	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.6 Circulating Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Leakage Boundary	Carbon and low alloy steel	Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-18 (A-32)	3.3.1-63	E, 3
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-18 (A-32)	3.3.1-63	E, 3
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-18 (A-32)	3.3.1-63	E, 3
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
		Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-7 (A-44)	3.3.1-57	E, 3
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.6 Circulating Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Raw Water – Salt Water (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.C1-15 (A-54)	3.3.1-58	E, 3

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Material is bronze ASTM designation B61 which contains < 15% Zn, therefore, the aging mechanism of selective leaching does not apply.
2. Material is brass ASTM designation B43 or B135 which contains > 15% Zn, therefore, the aging mechanism of selective leaching applies.
3. The Periodic Inspection Program will be used to manage the aging effects in the raw water - salt water environment for the Circulating Water System.

Table 3.3.2.1.7
Containment Inerting System
Summary of Aging Management Evaluation

Table 3.3.2.1.7 Containment Inerting System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1

Table 3.3.2.1.7 Containment Inerting System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Drain Trap	Pressure Boundary	Cast Iron (Body)	Condensation (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F3-3 (A-13)	3.3.1-19	E
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
			Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Flow Element	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	None	None	VII.F3-6 (A-11)	3.3.1-16	I, 2
			Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E

Table 3.3.2.1.7 Containment Inerting System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Copper	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
		Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Thermowell	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Valve Body	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	None	None	VII.F3-6 (A-11)	3.3.1-16	I, 2
			Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.7 Containment Inerting System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
		Copper Alloy	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
		Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Closure bolting in an "Outdoor Air (External)" environment includes the aging effect/mechanism of "Loss of preload/stress relaxation".
2. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.

Table 3.3.2.1.8
Containment Vacuum Breakers
Summary of Aging Management Evaluation

Table 3.3.2.1.8 Containment Vacuum Breakers

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	VII.I-4 (AP-27)	3.3.1-35	E, 1
				Loss Of Preload	ASME Section XI, Subsection IWE (B.1.27)	VII.I-5 (AP-26)	3.3.1-35	E, 1
Expansion Joint	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
		Stainless Steel	Containment Atmosphere (Internal)	Cracking Initiation and Growth	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-5 (C-22)	3.5.1-18	A

Table 3.3.2.1.8 Containment Vacuum Breakers (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Expansion Joint	Pressure Boundary	Stainless Steel	Containment Atmosphere (Internal)	Cracking Initiation and Growth	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-5 (C-22)	3.5.1-18	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
			Indoor Air (External)	Cracking Initation and Growth	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-5 (C-22)	3.5.1-18	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-5 (C-22)	3.5.1-18	B
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	V.C-1 (E-35)	3.2.1-2	E
					ASME Section XI, Subsection IWE (B.1.27)	V.C-1 (E-35)	3.2.1-2	E
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.C-1 (E-35)	3.2.1-2	E
			Indoor Air (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	V.C-1 (E-35)	3.2.1-2	E

Table 3.3.2.1.8 Containment Vacuum Breakers (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	V.C-1 (E-35)	3.2.1-2	E
		Stainless Steel	Containment Atmosphere (Internal)	Cracking Initiation and Growth	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-5 (C-22)	3.5.1-18	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-5 (C-22)	3.5.1-18	D
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
			Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G
				Loss of Material	One-Time Inspection (B.1.24)	V.C-4 (E-33)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.C-4 (E-33)	3.2.1-3	E
Valve Body	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	C
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	C

Table 3.3.2.1.8 Containment Vacuum Breakers (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.C-1 (E-35)	3.2.1-2	E
		Stainless Steel	Containment Atmosphere (Internal)	Cracking Initiation and Growth	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-5 (C-22)	3.5.1-18	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-5 (C-22)	3.5.1-18	D
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	C
			Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G
				Loss of Material	One-Time Inspection (B.1.24)	V.C-4 (E-33)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.C-4 (E-33)	3.2.1-3	E
Valve Body (Vacuum Breakers)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	C

Table 3.3.2.1.8 Containment Vacuum Breakers (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body (Vacuum Breakers)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.C-1 (E-35)	3.2.1-2	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. ASME Section XI, Subsection IWE is the proper aging management program for these components.

Table 3.3.2.1.9
Control Rod Drive System
Summary of Aging Management Evaluation

Table 3.3.2.1.9 Control Rod Drive System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
						VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
						VII.I-5 (AP-26)	3.3.1-35	B
		High Strength Alloy Steel	Containment Atmosphere (External)	Cracking Initiation and Growth	Bolting Integrity (B.1.12)	VII.E1-1 (A-104)	3.3.1-7	E, 3
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A, 3
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B, 3
				Loss of Preload	Bolting Integrity (B.1.12)	IV.C1-12 (R-27)	3.1.1-44	B, 3

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter	Filter	Stainless Steel	Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Filter Housing	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Flow Element	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Gear Box	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
Piping and fittings	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 1

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 4
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Pump Casing	Pressure Boundary	Carbon and low alloy steel (Oil pump)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
		Stainless Steel (CRD pump)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Restricting Orifice	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Restricting Orifice	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Throttle	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Rupture Disks	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Strainer	Filter	Stainless Steel	Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Strainer Body	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Valve Body	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E
					Selective Leaching of Materials (B.1.25)	VII.C2-6 (AP-32)	3.3.1-65	A

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Brass	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.K-1 (AP-70)	3.3.1-23	E
		Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 5, 6
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 4, 5

Table 3.3.2.1.9 Control Rod Drive System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 6
						IV.C1-2 (R-55)	3.1.1-21	E, 5, 6
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 6
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
2. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
3. Control Rod Drive flange bolting is high strength.
4. SCC and IGSCC of carbon and low alloy steel are not considered applicable aging mechanisms in a treated water environment per EPRI Mechanical Tools Appendix A.
5. The applicable programs for the aging effect of cracking as identified in line items IV.C1-1 (R-03) and IV.C1-2 (R-55) for class 1 piping, fittings and branch connections < NPS 4 have been applied to Class 1 valves < NPS 4.

6. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to valves.

Table 3.3.2.1.10
Control Room HVAC
Summary of Aging Management Evaluation

Table 3.3.2.1.10 Control Room HVAC

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Filter	Aluminum	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Galvanized Steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 5
		Galvanized Steel	Indoor Air (External)	None	None			G, 4
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	A
		Stainless Steel	Indoor Air (External)	None	None			G, 4
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	A
Damper housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.F1-1 (A-10)	3.3.1-16	E

Table 3.3.2.1.10 Control Room HVAC (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-2 (A-08)	3.3.1-16	E
		Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Door Seal	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-8 (A-36)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-9 (A-73)	3.3.1-28	E
			Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-11 (A-17)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-10 (A-18)	3.3.1-28	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G

Table 3.3.2.1.10 Control Room HVAC (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	Pressure Boundary	Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Fan Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-1 (A-10)	3.3.1-16	E
		Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Filter Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-2 (A-08)	3.3.1-16	E
		Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1

Table 3.3.2.1.10 Control Room HVAC (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter Housing	Pressure Boundary	Galvanized Steel	Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Flexible Connection	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-8 (A-36)	3.3.1-10	E
			Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-11 (A-17)	3.3.1-10	E
Heat Exchangers (Condensing Coil)	Heat Transfer	Copper (coils)	Outdoor Air (External)	Reduction of Heat Transfer	Periodic Inspection of Ventilation Systems (B.2.4)			G
			Refrigerant (Internal)	None	None			G, 3
		Copper (fins)	Outdoor Air (External)	Reduction of Heat Transfer	Periodic Inspection of Ventilation Systems (B.2.4)			G
	Pressure Boundary	Copper (coils)	Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
			Refrigerant (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	C
Heat Exchangers (Evaporator Coil)	Heat Transfer	Aluminum (fins)	Indoor Air (External)	Reduction of Heat Transfer	Periodic Inspection of Ventilation Systems (B.2.4)			G, 2

Table 3.3.2.1.10 Control Room HVAC (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Evaporator Coil)	Heat Transfer	Copper (coils)	Indoor Air (External)	Reduction of Heat Transfer	Periodic Inspection of Ventilation Systems (B.2.4)			G, 2
			Refrigerant (Internal)	None	None			G, 3
	Pressure Boundary	Copper (coils)	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F1-17 (A-46)	3.3.1-23	E, 2
			Refrigerant (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	C
Heater Housing	Pressure Boundary	Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Louvers	Pressure Boundary	Aluminum	Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 1
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Table 3.3.2.1.10 Control Room HVAC (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
			Refrigerant (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
		Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
			Refrigerant (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
		Polyvinyl Chloride (PVC, CPVC)	Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			F, 6
			Raw Water – Fresh Water (Internal)	None	None			F, 7

Table 3.3.2.1.10 Control Room HVAC (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Ventilation system components in the scope of license renewal at Oyster Creek are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal is "Indoor Air (Internal)."
2. The refrigeration evaporator coils and fins are a continuously wetted surface due to condensation.
3. Copper heat exchanger tubes with refrigerant gas are not addressed in NUREG-1801. Aging effects are based on industry standards (EPRI Mechanical Tools Appendix G).
4. The aging effects for stainless steel and galvanized ventilation closure bolting in an indoor air environment is none. This is consistent with industry guidance.
5. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.
6. Polyvinyl Chloride has a change in material properties when exposed to ultraviolet radiation (sunlight). This is consistent with industry guidance.

The CR HVAC B Unit and PVC drain line are roof mounted.
no aging effects for identified environment based on industry standards.

7. Polyvinyl Chloride has no aging effects for the identified raw water environment based on industry standards..

Table 3.3.2.1.11
Cranes and Hoists
Summary of Aging Management Evaluation

Table 3.3.2.1.11 Cranes and Hoists

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Crane (Bridge; Trolley)	Structural Support	Carbon and low alloy steel	Indoor Air	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.B-2 (A-06)	3.3.1-1	A
			Outdoor Air	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G
Crane (Bridge; Trolley; Girders)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.B-3 (A-07)	3.3.1-55	B
			Outdoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	III.A.3-12 (T-11)	3.5.1-21	E, 1
Hoists (Jib Crane Columns, Beams, Plates, Anchorage)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.B-3 (A-07)	3.3.1-55	B
Hoists (Monorail Beams, Lifting Devices, Plates)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.B-3 (A-07)	3.3.1-55	B

Table 3.3.2.1.11 Cranes and Hoists (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Rail System (Rail, Plates, Clips)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.B-1 (A-05)	3.3.1-56	B
						VII.B-3 (A-07)	3.3.1-55	B
			Outdoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	III.A3-12 (T-11)	3.5.1-21	E, 3
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.I-4 (AP-27)	3.3.1-35	E, 2
				Loss Of Preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.I-5 (AP-26)	3.3.1-35	E, 2
			Outdoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.I-1 (AP-28)	3.3.1-36	E, 2
				Loss Of Preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)			H, 2

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Environment is not in NUREG-1801 for this component; but the material environment combination is evaluated. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program is the applicable Aging Management Program for the component instead of Structures Monitoring Program.
2. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program is the applicable Aging Management Program for the component instead of the Structures Monitoring Program.
3. Loss of material includes loss of material due to general corrosion and loss of material due to wear for this component.

Table 3.3.2.1.12
Drywell Floor and Equipment Drains
Summary of Aging Management Evaluation

Table 3.3.2.1.12 Drywell Floor and Equipment Drains

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B

Table 3.3.2.1.12 Drywell Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						VII.I-5 (AP-26)	3.3.1-35	B
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
Flow Glass	Leakage Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 3
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E, 1
		Glass	Containment Atmosphere (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Raw Water – Fresh Water (Internal)	None	None	VII.J-13 (AP-50)	3.3.1-75	A

Table 3.3.2.1.12 Drywell Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (DWEDT)	Leakage Boundary	Carbon and low alloy steel (Covers)	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 2, 3
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E, 1, 2
		Stainless Steel (Nozzles, Plates)	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 2
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E, 1, 2
	Structural Support	Stainless Steel (Carrying Bars)	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 2
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.C1-19 (A-01)	3.3.1-18	B
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.12 Drywell Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-7 (E-44)	3.2.1-2	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.C-8 (E-32)	3.2.1-5	E, 4
		Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.C-5 (E-34)	3.2.1-8	E
Pump Casing (DWEDT pumps)	Leakage Boundary	Cast Iron	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 3
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A

Table 3.3.2.1.12 Drywell Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks (DWEDT)	Leakage Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.E-7 (E-44)	3.2.1-2	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.C-8 (E-32)	3.2.1-5	E

Table 3.3.2.1.12 Drywell Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.C-5 (E-34)	3.2.1-8	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The One-Time Inspection program confirms the absence of aging effects in pooled or potentially stagnant flow areas of drain piping and piping elements.
2. Heat Exchanger is a plate type consisting of plates, covers, nozzles, and carrying bars.
3. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
4. The low pressure vessel flange drain line (CS) is intended to collect condensate that may leak past both vessel o-ring seals. Although this would originally have been treated water, it is considered to be a raw water - fresh water environment (in the same manner as the balance of the drywell floor and equipment drain water).

Table 3.3.2.1.13
Emergency Diesel Generator and Auxiliary System
Summary of Aging Management Evaluation

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Filter	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
		Stainless Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G, 9
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 9
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 9

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.F4-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-2 (A-08)	3.3.1-16	E
Exhaust Stack	Pressure Boundary	Carbon and low alloy steel	Diesel Engine Exhaust Gases (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.H2-2 (A-27)	3.3.1-17	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Fan Housing (Dust Bin Blower Fan)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.F4-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-2 (A-08)	3.3.1-16	E
Fan Housing (Radiator Fan)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.F4-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-2 (A-08)	3.3.1-16	E
Filter (Inertial Air Bin)	Filter	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.F4-1 (A-10)	3.3.1-16	E
Filter (Oil Bath)	Filter	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-1 (A-10)	3.3.1-16	E, 5

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter (Oil Bath)	Filter	Carbon and low alloy steel	Oil (External)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-14 (AP-30)	3.3.1-16	E, 5
Filter Housing (Air Cooling)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.F4-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-2 (A-08)	3.3.1-16	E
Filter Housing (Fuel Oil)	Pressure Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Filter Housing (Lube Oil)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-20 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.H2-20 (AP-30)	3.3.1-16	E
Flame Arrestor (Fuel Oil Tank)	Filter	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flame Arrestor (Fuel Oil Tank)	Fire Barrier	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Flexible Hose	Pressure Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.H1-8 (A-24)	3.3.1-16	E
Heat Exchanger (Lube Oil Cooler)	Heat Transfer	Aluminum (fins)	Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Monitoring Activities (B.2.2)			F
		Brass (tubes)	Closed Cooling Water (Internal)	None	None			H, 7
			Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Monitoring Activities (B.2.2)			G
	Pressure Boundary	Brass (tubes)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.F1-13 (AP-34)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.F1-14 (AP-65)	3.3.1-65	A
			Lubricating Oil (External)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-10 (AP-47)	3.3.1-24	E

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Lube Oil Cooler)	Pressure Boundary	Brass (tubes)	Lubricating Oil (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.H2-10 (AP-47)	3.3.1-24	E
		Carbon and low alloy steel (shell side components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-3 (AP-39)	3.3.1-21	E
					One-Time Inspection (B.1.24)	VII.H2-3 (AP-39)	3.3.1-21	E
Heat Exchangers (Radiator)	Heat Transfer	Aluminum (Fins)	Outdoor Air (External)	Reduction of Heat Transfer	Periodic Inspection Program (B.2.5)			F
		Brass (tubes)	Closed Cooling Water (Internal)	None	None			H, 7
			Outdoor Air (External)	Reduction of Heat Transfer	Periodic Inspection Program (B.2.5)			G
	Pressure Boundary	Brass (tube side components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.F1-13 (AP-34)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.F1-14 (AP-65)	3.3.1-65	A

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Radiator)	Pressure Boundary	Brass (tube side components)	Outdoor Air (External)	Loss of Material	Periodic Inspection Program (B.2.5)			G
		Brass (tubes)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.F1-13 (AP-34)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.F1-14 (AP-65)	3.3.1-65	A
			Outdoor Air (External)	Loss of Material	Periodic Inspection Program (B.2.5)			G
Louvers	Direct Flow	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Muffler	Pressure Boundary	Carbon and low alloy steel	Diesel Engine Exhaust Gases (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.H2-2 (A-27)	3.3.1-17	E
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-24 (A-25)	3.3.1-42	B
					One-Time Inspection (B.1.24)	VII.H2-24 (A-25)	3.3.1-42	E, 3
			Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	A
			Condensation (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-3 (A-13)	3.3.1-19	E
			Diesel Engine Exhaust Gases (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.H2-2 (A-27)	3.3.1-17	E
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-20 (AP-30)	3.3.1-16	E

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.H2-20 (AP-30)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.H1-8 (A-24)	3.3.1-16	E
		Stainless Steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
					One-Time Inspection (B.1.24)	VII.C2-9 (A-52)	3.3.1-39	E, 3
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-6 (AP-54)	3.3.1-54	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-17 (AP-59)	3.3.1-27	E
					One-Time Inspection (B.1.24)	VII.H2-17 (AP-59)	3.3.1-27	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Fuel Oil)	Pressure Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Pump Casing (Lube Oil)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-20 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.H2-20 (AP-30)	3.3.1-16	E
Restricting Orifice	Pressure Boundary	Brass	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-8 (AP-12)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.H2-12 (AP-43)	3.3.1-65	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-10 (AP-47)	3.3.1-24	E

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Restricting Orifice	Pressure Boundary	Brass	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.H2-10 (AP-47)	3.3.1-24	E
	Throttle	Brass	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-8 (AP-12)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.H2-12 (AP-43)	3.3.1-65	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-10 (AP-47)	3.3.1-24	E
					One-Time Inspection (B.1.24)	VII.H2-10 (AP-47)	3.3.1-24	E
Sensor Element (Lube Oil)	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)			G, 2
					One-Time Inspection (B.1.24)			G, 2
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sensor Element (Lube Oil)	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-17 (AP-59)	3.3.1-27	E
					One-Time Inspection (B.1.24)	VII.H2-17 (AP-59)	3.3.1-27	E
Sensor Element (Temperature Control Manifold)	Pressure Boundary	Brass	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-8 (AP-12)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.H2-12 (AP-43)	3.3.1-65	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
		Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-24 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Sight Glasses	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Glasses	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-20 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.H2-20 (AP-30)	3.3.1-16	E
		Glass	Closed Cooling Water (Internal)	None	None			G, 6
			Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Lubricating Oil (Internal)	None	None	VII.J-12 (AP-15)	3.3.1-75	A
Strainer	Filter	Stainless Steel	Fuel Oil (External)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-6 (AP-54)	3.3.1-54	B
			Lubricating Oil (External)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-17 (AP-59)	3.3.1-27	E
					One-Time Inspection (B.1.24)	VII.H2-17 (AP-59)	3.3.1-27	E
Strainer Body	Pressure Boundary	Aluminum	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-1 (AP-35)	3.3.1-25	B

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Pressure Boundary	Aluminum	Fuel Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.H1-1 (AP-35)	3.3.1-25	A
			Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)			G, 2
					One-Time Inspection (B.1.24)			G, 2
		Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-20 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.H2-20 (AP-30)	3.3.1-16	E
Tanks (Fuel Day Tank)	Pressure Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B, 10

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks (Fuel Day Tank)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Tanks (Fuel Oil Tank)	Pressure Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B, 10
			Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VII.H1-11 (A-95)	3.3.1-33	B
Tanks (Immersion Heater)	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-24 (A-25)	3.3.1-42	B
					One-Time Inspection (B.1.24)	VII.H2-24 (A-25)	3.3.1-42	E,3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Tanks (Water Tank)	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-24 (A-25)	3.3.1-42	B
					One-Time Inspection (B.1.24)	VII.H2-24 (A-25)	3.3.1-42	E, 3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Temperature Control Manifold (Water Cooling)	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-24 (A-25)	3.3.1-42	B

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Temperature Control Manifold (Water Cooling)	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.H2-24 (A-25)	3.3.1-42	E, 3
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Thermowell	Pressure Boundary	Brass	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-8 (AP-12)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.H2-12 (AP-43)	3.3.1-65	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
Valve Body	Leakage Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.H1-8 (A-24)	3.3.1-16	E
	Pressure Boundary	Aluminum	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-1 (AP-35)	3.3.1-25	B
					One-Time Inspection (B.1.24)	VII.H1-1 (AP-35)	3.3.1-25	A

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
		Brass	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.H2-8 (AP-12)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.H2-12 (AP-43)	3.3.1-65	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-3 (AP-44)	3.3.1-26	B, 8
					One-Time Inspection (B.1.24)	VII.H1-3 (AP-44)	3.3.1-26	A, 8
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-10 (AP-47)	3.3.1-24	E
					One-Time Inspection (B.1.24)	VII.H2-10 (AP-47)	3.3.1-24	E
		Carbon and low alloy steel	Condensation (Internal)	Loss of Material	Periodic Inspection Program (B.2.5)	VII.F4-3 (A-13)	3.3.1-19	E
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-20 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.H2-20 (AP-30)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.H1-8 (A-24)	3.3.1-16	E
		Stainless Steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-6 (AP-54)	3.3.1-54	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-17 (AP-59)	3.3.1-27	E

Table 3.3.2.1.13 Emergency Diesel Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.H2-17 (AP-59)	3.3.1-27	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for carbon steel closure bolting in an outdoor environment also includes loss of preload.
2. The aging effect for aluminum with a lubricating oil (internal) environment is based on industry standards (EPRI Mechanical Tools, Report Number 1003056, Appendix C) and assumes the potential for water pooling/separation in aluminum components.
3. The One-Time Inspection program confirms the absence of aging effects in stagnant flow areas.
4. The One-Time Inspection is applied to the carbon steel and brass drain piping with a raw water environment.
5. Reusable steel filter element subjected to an oil bath.
6. There is no aging effect for glass in the component cooling water environment. This is consistent with industry standards and NUREG 1801 line items for treated water VII.J-15 (AP-51) and raw water VII.J-13 (AP-50).
7. Aging effects on heat transfer function are based on industry standards (EPRI Mechanical Tools,Report Number 1003056, Appendiix G). Fouling is not a significant aging mechanism for brass tubes with closed cooling water environment.
8. Aging effect of loss of material is applied to copper alloy with a fuel oil environment. Presence of water is not assumed and confirmed by the Fuel Oil Chemistry program.
9. The aging effects for stainless steel closure bolting in an outdoor air (external) environment include loss of material and loss of preload. The aging effect for stainless steel closure bolting in an indoor environment includes loss of preload.

10. The fuel oil tanks are subject to internal inspections as part of the Fuel Oil Chemistry program, and therefore application of the One-Time Inspection program for this component is not necessary.

Table 3.3.2.1.14
Emergency Service Water System
Summary of Aging Management Evaluation

Table 3.3.2.1.14 Emergency Service Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 6
			Raw Water – Salt Water (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 8
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 8

Table 3.3.2.1.14 Emergency Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Soil (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 5
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 5
		Stainless Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G, 1
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 10
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 10
Expansion Joint	Pressure Boundary	Elastomer	Outdoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 7
			Raw Water – Salt Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)			G, 3
Flow Element	Pressure Boundary	Nickel Alloy	Indoor Air (External)	None	None	VII.J-16 (AP-16)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-13 (AP-53)	3.3.1-61	A
Heat Exchangers (Containment Spray)	Heat Transfer	Titanium (Tubes)	Raw Water – Salt Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.1.13)			F, 2

Table 3.3.2.1.14 Emergency Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Containment Spray)	Heat Transfer	Titanium (Tubes)	Treated Water (External)	Reduction of Heat Transfer	Water Chemistry (B.1.2)			F, 2
	Pressure Boundary	Aluminum Bronze (tubesheet)	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	C
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	C
			Treated Water (External)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.C2-6 (AP-32)	3.3.1-65	C
		Carbon and low alloy steel (Shell Side Components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-3 (S-18)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-3 (S-18)	3.4.1-2	B
		Copper Alloy (Tube Side Components)	Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	C

Table 3.3.2.1.14 Emergency Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Containment Spray)	Pressure Boundary	Copper Alloy (Tube Side Components)	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	C
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	C
		Titanium (Tubes)	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)			F, 2
			Treated Water (External)	Loss of Material	Water Chemistry (B.1.2)			F, 2
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
	Pressure Boundary	Brass	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 4

Table 3.3.2.1.14 Emergency Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Brass	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Bronze	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Carbon and low alloy steel (w/coating or wrapping)	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.C1-19 (A-01)	3.3.1-18	B, 9
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.14 Emergency Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Pump Casing (ESW Pumps)	Pressure Boundary	Stainless Steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Raw Water – Salt Water	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Pump Casing (HTXR Drain Pumps)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Restricting Orifice	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
	Throttle	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A

Table 3.3.2.1.14 Emergency Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Glasses	Pressure Boundary	Bronze (Body)	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Glass (Window)	Indoor Air (External)	None	None	V.F-8 (EP-15)	3.2.1-33	A
			Raw Water – Salt Water (Internal)	None	None	V.F-10 (EP-28)	3.2.1-33	A
Thermowell	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.14 Emergency Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
	Pressure Boundary	Brass	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 4
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effect for stainless steel closure bolting in an indoor air (external) environment is loss of preload.
2. Titanium is not addressed in NUREG-1801. Aging effects are based on industry standards (EPRI Mechanical Tools Appendices B, E, and G).
3. The Structures Monitoring Program includes external surface inspections but does not include internal surface inspections. The Periodic Inspection Program will inspect this component for internal aging effects.
4. The environment for copper alloy (brass/bronze/copper) in an outdoor air (external) environment is loss of material based on industry standards (EPRI Mechanical Tools Appendices E).
5. The aging effects for closure bolting in a buried (soil) external environment include loss of material and loss of preload. External inspections of buried bolting will occur in accordance with the frequency outlined in the Buried Piping Inspection program.
6. The aging effects for carbon and alloy steel closure bolting in an outdoor air (external) environment also include loss of preload.
7. Change in material properties will be detected by the Structures Monitoring Program external surfaces inspections.
8. The aging effects for carbon and alloy steel closure bolting in a raw water - salt water (external) environment include loss of material and loss of preload.
9. Exterior coating or wrapping is applied to all carbon steel piping and fittings that are exposed to a soil (external) environment.
10. The aging effects for stainless steel closure bolting in an outdoor air (external) environment include loss of material and loss of preload.

Table 3.3.2.1.15
Fire Protection System
Summary of Aging Management Evaluation

Table 3.3.2.1.15 Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
			Soil (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 7
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 7
		Stainless Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
			Raw Water – Fresh Water (External)	Loss of Material	Bolting Integrity (B.1.12)			G

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Stainless Steel	Raw Water – Fresh Water (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
Dikes	Fire Barrier (Contain oil spill)	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Expansion Joint	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.F3-7 (A-36)	3.3.1-10	E
			Raw Water – Fresh Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)			G
Fire Barrier Penetration Seals	Fire Barrier	Elastomer	Indoor Air	Change in Material Properties	Fire Protection (B.1.19)	VII.G-1 (A-19)	3.3.1-46	B
		Grout	Indoor Air	Cracking	Fire Protection (B.1.19)			F
Fire Barrier Walls and Slabs	Fire Barrier	Concrete	Indoor Air	Cracking	Fire Protection (B.1.19)	VII.G-25 (A-90)	3.3.1-49	B
					Structures Monitoring Program (B.1.31)	VII.G-25 (A-90)	3.3.1-49	A
				Loss of Material	Fire Protection (B.1.19)	VII.G-26 (A-91)	3.3.1-50	B
					Structures Monitoring Program (B.1.31)	VII.G-26 (A-91)	3.3.1-50	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Barrier Walls and Slabs	Fire Barrier	Concrete	Outdoor Air	Change in Material Properties	Fire Protection (B.1.19)			H, 2
					Structures Monitoring Program (B.1.31)			H, 2
				Cracking	Fire Protection (B.1.19)	VII.G-27 (A-92)	3.3.1-49	B
					Structures Monitoring Program (B.1.31)	VII.G-27 (A-92)	3.3.1-49	A
				Loss of Material	Fire Protection (B.1.19)	VII.G-28 (A-93)	3.3.1-50	B
					Structures Monitoring Program (B.1.31)	VII.G-28 (A-93)	3.3.1-50	A
		Gypsum board	Indoor Air	None	None			F
Fire Doors	Fire Barrier	Carbon and low alloy steel	Indoor Air	Loss of Material	Fire Protection (B.1.19)	VII.G-3 (A-21)	3.3.1-47	B
			Outdoor Air	Loss of Material	Fire Protection (B.1.19)	VII.G-4 (A-22)	3.3.1-47	B
Fire hydrant	Pressure Boundary	Cast Iron	Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-8 (A-78)	3.3.1-12	E

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire hydrant	Pressure Boundary	Cast Iron	Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
					Selective Leaching of Materials (B.1.25)	VII.G-14 (AP-29)	3.3.1-67	A
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.G-22 (A-01)	3.3.1-18	B
					Selective Leaching of Materials (B.1.25)	VII.G-12 (A-02)	3.3.1-66	A
Fire Rated Enclosures	Fire Barrier	Alumina Silica	Indoor Air	Change in Material Properties	Fire Protection (B.1.19)			F
				Cracking	Fire Protection (B.1.19)			F
		Elastomer	Indoor Air	Change in Material Properties	Fire Protection (B.1.19)	VII.G-1 (A-19)	3.3.1-46	D
		Mecatiss	Indoor Air	Change in Material Properties	Fire Protection (B.1.19)			F
		Pyrocrete	Indoor Air (External)	Cracking	Fire Protection (B.1.19)			F
				Loss of Material	Fire Protection (B.1.19)			F

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Rated Enclosures	Fire Barrier	Thermo-Lag	Indoor Air (External)	Cracking	Fire Protection (B.1.19)			F
				Loss of Material	Fire Protection (B.1.19)			F
Flexible Hose	Pressure Boundary	Copper	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
		Elastomer	Fuel Oil (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)			G
			Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.F2-7 (A-36)	3.3.1-10	E
		Polyethylene (teflon)	Dry Gas (Internal)	None	None			F
			Indoor Air (External)	None	None			F
		Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flexible Hose	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-17 (A-55)	3.3.1-52	A
Flow Element (Annubar)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-17 (A-55)	3.3.1-52	A
Gas Bottles (CO2, Halon Storage Cylinders)	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Fire Protection (B.1.19)	VII.I-7 (A-77)	3.3.1-12	E
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Gauge Snubber	Pressure Boundary	Stainless Steel	Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-17 (A-55)	3.3.1-52	A
Gear Box	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.G-20 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.G-20 (AP-30)	3.3.1-16	E
Heat Exchangers	Heat Transfer	Copper Alloy (Tubes)	Lubricating Oil (Internal)	Reduction of Heat Transfer	Lubricating Oil Monitoring Activities (B.2.2)			G
			Raw Water – Fresh Water (External)	Reduction of Heat Transfer	Fire Water System (B.1.20)	VII.C1-4 (A-72)	3.3.1-60	E, 4
	Pressure Boundary	Copper Alloy (Shell)	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	C
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.C1-1 (A-65)	3.3.1-57	E, 4
		Copper Alloy (Tubes)	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.C1-6 (AP-47)	3.3.1-24	E
					One-Time Inspection (B.1.24)	VII.C1-6 (AP-47)	3.3.1-24	E

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers	Pressure Boundary	Copper Alloy (Tubes)	Raw Water – Fresh Water (External)	Loss of Material	Fire Water System (B.1.20)	VII.C1-1 (A-65)	3.3.1-57	E, 4
Hose Manifold	Pressure Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
Odorizer	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Protection (B.1.19)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	Fire Protection (B.1.19)	VII.I-7 (A-77)	3.3.1-12	E
Piping and fittings	Pressure Boundary	Brass	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
					Selective Leaching of Materials (B.1.25)	VII.G-10 (A-47)	3.3.1-65	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Fuel Oil (Internal)	Loss of Material	Fire Protection (B.1.19)	VII.G-19 (A-28)	3.3.1-48	B
					Fuel Oil Chemistry (B.1.22)	VII.G-19 (A-28)	3.3.1-48	B
			Indoor Air (External)	Loss of Material	Fire Protection (B.1.19)	VII.I-7 (A-77)	3.3.1-12	E
					Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	Fire Protection (B.1.19)	VII.F3-6 (A-11)	3.3.1-16	E
					Fire Water System (B.1.20)	VII.F3-6 (A-11)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Fire Protection (B.1.19)	VII.I-8 (A-78)	3.3.1-12	E
					Fire Water System (B.1.20)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.G-22 (A-01)	3.3.1-18	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-17 (A-55)	3.3.1-52	A
Pump Casing (Redundant Fire Pump)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
Pump Casing (Vertical Turbine)	Pressure Boundary	Bronze (bowls)	Raw Water – Fresh Water (External)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
					Selective Leaching of Materials (B.1.25)	VII.G-10 (A-47)	3.3.1-65	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
					Selective Leaching of Materials (B.1.25)	VII.G-10 (A-47)	3.3.1-65	A
		Carbon and low alloy steel (column pipe)	Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-8 (A-78)	3.3.1-12	E

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Vertical Turbine)	Pressure Boundary	Carbon and low alloy steel (column pipe)	Raw Water – Fresh Water (External)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
		Cast Iron (discharge head)	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
					Selective Leaching of Materials (B.1.25)	VII.G-14 (AP-29)	3.3.1-67	A
Restricting Orifice	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
	Throttle	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
Spray Nozzle (CO2, Halon)	Spray	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Spray Nozzle (CO2, Halon)	Spray	Brass	Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Protection (B.1.19)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	Fire Protection (B.1.19)	VII.F3-6 (A-11)	3.3.1-16	E
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Sprinkler Heads	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)			G
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
					Selective Leaching of Materials (B.1.25)	VII.G-10 (A-47)	3.3.1-65	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sprinkler Heads	Spray	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)			G
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
					Selective Leaching of Materials (B.1.25)	VII.G-10 (A-47)	3.3.1-65	A
Strainer	Filter	Stainless Steel	Raw Water – Fresh Water (External)	Loss of Material	Fire Water System (B.1.20)	VII.G-17 (A-55)	3.3.1-52	A
Strainer Body	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
		Cast Iron	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Pressure Boundary	Cast Iron	Raw Water – Fresh Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.G-14 (AP-29)	3.3.1-67	A
Tank Heater	Pressure Boundary	Stainless Steel	Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VII.F3-4 (A-09)	3.3.1-23	E, 3
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-17 (A-55)	3.3.1-52	A
Tanks (CO2)	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VII.H1-11 (A-95)	3.3.1-33	B
Tanks (Fuel Oil)	Pressure Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	D, 6
			Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VII.H1-11 (A-95)	3.3.1-33	B
Tanks (Retarding Chamber)	Pressure Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
					Selective Leaching of Materials (B.1.25)	VII.G-14 (AP-29)	3.3.1-67	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks (Water Storage)	Pressure Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VII.H1-11 (A-95)	3.3.1-33	B
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
			Soil (External) (Tank bottom surface)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VII.G-22 (A-01)	3.3.1-18	E, 5
Thermowell	Pressure Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
Valve Body	Pressure Boundary	Brass	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)			G
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
					Selective Leaching of Materials (B.1.25)	VII.G-10 (A-47)	3.3.1-65	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Bronze	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.G-8 (AP-44)	3.3.1-26	B
					One-Time Inspection (B.1.24)	VII.G-8 (AP-44)	3.3.1-26	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)			G
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-9 (A-45)	3.3.1-51	A
					Selective Leaching of Materials (B.1.25)	VII.G-10 (A-47)	3.3.1-65	A
		Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Fuel Oil (Internal)	Loss of Material	Fire Protection (B.1.19)	VII.G-19 (A-28)	3.3.1-48	B
					Fuel Oil Chemistry (B.1.22)	VII.G-19 (A-28)	3.3.1-48	B

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Fire Protection (B.1.19)	VII.I-7 (A-77)	3.3.1-12	E
					Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Fire Protection (B.1.19)	VII.I-8 (A-78)	3.3.1-12	E
					Fire Water System (B.1.20)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.G-22 (A-01)	3.3.1-18	B
		Cast Iron	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
					Selective Leaching of Materials (B.1.25)	VII.G-14 (AP-29)	3.3.1-67	A

Table 3.3.2.1.15 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Cast Iron	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.G-22 (A-01)	3.3.1-18	B
					Selective Leaching of Materials (B.1.25)	VII.G-12 (A-02)	3.3.1-66	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-17 (A-55)	3.3.1-52	A
Water Motor Alarm	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)			G
		Cast Iron	Indoor Air (External)	Loss of Material	Fire Water System (B.1.20)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	Fire Water System (B.1.20)	VII.G-21 (A-33)	3.3.1-53	A
				Loss of Material	Selective Leaching of Materials (B.1.25)	VII.G-14 (AP-29)	3.3.1-67	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Aging effect is not addressed for this component, material and environment in NUREG-1801, but the identified aging management program is also appropriate for this aging effect.
2. Aging management programs recommended by NUREG-1801 item VII.G-27 (A-92) are also applicable for this aging effect.
3. The environment for stainless steel in outdoor air (external) includes condensation.
4. The Fire Water System aging management program is applicable to this fire protection system heat exchanger, as opposed to the Open-Cycle Cooling Water System program recommended by NUREG-1801 items VII.C1-1 (A-65) and VII.C1-4 (A-72).
5. Bottom surface of tank is exposed to soil environment, but this surface is not subject to inspection by NUREG-1801 recommended program. Tank bottom is addressed by Above Ground Outdoor Tanks program.
6. The fuel oil tank is subject to internal inspections as part of the Fuel Oil Chemistry program, and therefore application of the One-Time Inspection program for this component is not necessary.
7. The aging effects of carbon and alloy steel closure bolting in a soil (external) environment is loss of material and loss of preload. External inspections of buried bolting will occur in accordance with the frequency outlined in the Buried Piping Inspection program.

Table 3.3.2.1.16
Fuel Storage and Handling Equipment
Summary of Aging Management Evaluation

Table 3.3.2.1.16 Fuel Storage and Handling Equipment

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Cask Drop Protection Cylindrical Structure	Structural Support	Stainless Steel	Treated Water < 140F	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	C
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	D
Fuel Grapple/Mast	Structural Support	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C
			Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	C
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	D
Fuel Preparation Machine	Structural Support	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	C
					Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	D

Table 3.3.2.1.16 Fuel Storage and Handling Equipment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fuel Preparation Machine	Structural Support	Stainless Steel	Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	C
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	D
New Fuel Storage Racks	Structural Support	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C
Refueling platform	Structural Support	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.A1-1 (A-94)	3.3.1-68	E, 1
Spent Fuel Storage Racks	Absorb Neutrons	Boraflex	Treated Water < 140F	Reduction of Neutron-Absorbing Capacity	Boraflex Rack Management Program (B.1.15)	VII.A2-1 (A-87)	3.3.1-30	B
		Boral	Treated Water < 140F	None	None	VII.A2-2 (A-89)	3.3.1-29	I, 2
	Structural Support	Stainless Steel	Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	C
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	D
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.I-4 (AP-27)	3.3.1-35	E, 1

Table 3.3.2.1.16 Fuel Storage and Handling Equipment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss Of Preload	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)	VII.I-5 (AP-26)	3.3.1-35	E, 1

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program is the applicable Aging Management program for the component instead of the Structures Monitoring Program.
2. Based on past precedence (NUREG-1787, VC Summer SER, paragraph 3.5.2.4.2), the Staff concluded that Boral aging effects are insignificant and require no aging management. The staff noted that the potential aging effects resulting from sustained irradiation of Boral were previously evaluated by staff (BNL-NUREG-25582, dated January 1979) and determined to be insignificant. Oyster Creek installed four (4) spent fuel storage racks, manufactured by HOLTEC International, that utilized Boral neutron absorbing material, in year 2000. The Boral coupons kept inside the spent fuel storage pool were removed and inspected in 2002, and again in 2004. Inspection results showed no blisters, pits, dimensional changes, or other age related degradations. Neutron transmission tests on the irradiated coupon showed that average Boron-10 areal density in the irradiated coupon is 0.0209 grams/cm2, which means, within the experimental accuracy, Boron-10 has not been lost from the coupons. Plant operating experience is therefore consistent with the staff's conclusion as documented in NUREG-1787 and an aging management program is not required.

Table 3.3.2.1.17
Hardened Vent System
Summary of Aging Management Evaluation

Table 3.3.2.1.17 Hardened Vent System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
		Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
		Stainless Steel	Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 2
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 2
Enclosure Boot	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 3
			Outdoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 3

Table 3.3.2.1.17 Hardened Vent System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-6 (A-11)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Valve Body	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-6 (A-11)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for carbon and alloy steel closure bolting in an outdoor air (external) environment also include loss of preload.
2. The aging effects for stainless steel closure bolting in an outdoor air (external) environment include loss of material and loss of preload.
3. Change in material properties will be detected by the Structural Monitoring Program external inspections. Internal inspections will not be performed since the aging effects of the internal environment are bounded by the external environment aging effects.

Table 3.3.2.1.18
Heating & Process Steam System
Summary of Aging Management Evaluation

Table 3.3.2.1.18 Heating & Process Steam System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VIII.H-5 (S-33)	3.4.1-27	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-1 (S-32)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VIII.H-5 (S-33)	3.4.1-27	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-1 (S-32)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Sample)	Leakage Boundary	Copper	Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E, 7, 11
					Water Chemistry (B.1.2)	VII.K-1 (AP-70)	3.3.1-23	E, 7, 11
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A, 11
Flexible Connection	Leakage Boundary	Elastomer	Boiler Treated Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)	VII.A4-1 (A-16)	3.3.1-11	E, 4
			Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.F3-7 (A-36)	3.3.1-10	E
Flow Element	Leakage Boundary	Stainless Steel	Boiler Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VII.K-7 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.K-7 (AP-57)	3.3.1-23	E
			Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers	Leakage Boundary	Copper	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E, 2, 6, 11
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A, 11
			Outdoor Air (External)	Loss of Material	Periodic Inspection Program (B.2.5)			G, 3, 8, 11
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B, 9
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B, 9
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-8 (S-41)	3.4.1-5	E
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VIII.E-1 (S-01)	3.4.1-7	B

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Auxiliary Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	E, 5
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B
			Boiler Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VII.K-7 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.K-7 (AP-57)	3.3.1-23	E
			Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VIII.E-22 (SP-37)	3.4.1-11	E
Pump Casing - Chemical Addition Pump CH-P-11	Leakage Boundary	Stainless Steel	Boiler Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-7 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.K-7 (AP-57)	3.3.1-23	E
			Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
Pump Casing - Condensate Return Pumps P-13-1A/B, Chemical Feed Addition Pumps CH-P-6A/B, Boiler No. 1 Feed Pumps CH-P-4A/B, Boiler No. 2 Feed Pumps CH-P-3A/B, Deaerator Feed Pumps CH-P-5A/B, Chemical Recirc Pump CH-P-10	Leakage Boundary	Cast Iron	Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing - Condensate Return Pumps P-13-1A/B, Chemical Feed Addition Pumps CH-P-6A/B, Boiler No. 1 Feed Pumps CH-P-4A/B, Boiler No. 2 Feed Pumps CH-P-3A/B, Deaerator Feed Pumps CH-P-5A/B, Chemical Recirc Pump CH-P-10	Leakage Boundary	Cast Iron	Boiler Treated Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
Restricting Orifice	Leakage Boundary	Stainless Steel	Boiler Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VII.K-7 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.K-7 (AP-57)	3.3.1-23	E
			Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Glasses	Leakage Boundary	Carbon and low alloy steel	Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
		Glass	Boiler Treated Water (Internal)	None	None	VIII.I-9 (SP-35)	3.4.1-31	A
			Indoor Air (External)	None	None	VIII.I-5 (SP-33)	3.4.1-31	A
Soot Blowers	Leakage Boundary	Carbon and low alloy steel	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
Steam Trap	Leakage Boundary	Cast Iron	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A, 6

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Trap	Leakage Boundary	Cast Iron	Auxiliary Steam (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-8 (S-41)	3.4.1-5	E
		Copper Alloy	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E, 6
					Selective Leaching of Materials (B.1.25)	VII.K-6 (AP-32)	3.3.1-65	A, 6
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E
					Selective Leaching of Materials (B.1.25)	VII.K-6 (AP-32)	3.3.1-65	A

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Trap	Leakage Boundary	Copper Alloy	Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 3
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-8 (S-41)	3.4.1-5	E
		Cast Iron	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A, 6

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Cast Iron	Auxiliary Steam (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-8 (S-41)	3.4.1-5	E
Tanks - Chemical Feed Addition Tanks CH-T-3A/B	Leakage Boundary	Polymers	Boiler Treated Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)			F, 10
			Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)			F, 10

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks - Deaerator CH-T-2, Condensate Return Unit T-13-1, Heating Boiler Condensate Storage Tank T-13-2, Heating Boiler Flash Tank T-13-3	Leakage Boundary	Carbon and low alloy steel	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B, 9
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B, 9

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-8 (S-41)	3.4.1-5	E
		Cast Iron	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-3 (S-04)	3.4.1-2	A
					Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A, 6
					Water Chemistry (B.1.2)	VIII.J-3 (S-04)	3.4.1-2	B, 9
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B, 9
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-8 (S-41)	3.4.1-5	E

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Copper Alloy	Auxiliary Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E, 6
					Selective Leaching of Materials (B.1.25)	VII.K-6 (AP-32)	3.3.1-65	A, 6
			Boiler Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E
					Selective Leaching of Materials (B.1.25)	VII.K-6 (AP-32)	3.3.1-65	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 3
		Stainless Steel	Auxiliary Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	E, 5
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B

Table 3.3.2.1.18 Heating & Process Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Boiler Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VII.K-7 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.K-7 (AP-57)	3.3.1-23	E
			Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for carbon and alloy steel closure bolting in an outdoor air (external) environment also include loss of preload.
2. Steam coils mounted in ductwork and unit heater fixtures use copper tubing containing less that 15% zinc. Leaching is not required to be considered as an aging mechanism for these components.
3. The aging effect for copper or copper alloy (brass/bronze) in an outdoor air (external) environment is loss of material based on industry standards (EPRI Mechanical Tools Appendix E).
4. The Structures Monitoring Program includes external surface inspections but does not include internal surface inspections. The Periodic Inspection Program will inspect this component for internal aging effects.
5. The One-Time Inspection program has been added to the Water Chemistry program for aging management of stainless steel loss of material for this item.
6. The environment of auxiliary steam is considered similar to the environment of boiler treated water for evaluation of this component and material.
7. Copper tubing in these items contains less than 15% zinc and is not subject to leaching.
8. The Periodic Inspection Program will inspect copper coils mounted in rooftop (outside) ductwork.
9. Heating and Process Steam is not included in the Oyster Creek Flow-Accelerated Corrosion program due to periodic system operation and low sustained system flowrates.

10. The chemical feed addition tanks contain treated water with chemicals for conditioning of the auxiliary boiler feedwater. The external surfaces of these tanks will be examined per the Structures Monitoring Program. Internal surfaces of these tanks will be inspected for aging effects per the Periodic Inspection Program.
11. Component is constructed of coiled or rows of tubing and is considered to be in the piping, piping component, and piping element component category.

Table 3.3.2.1.19
Hydrogen & Oxygen Monitoring System
Summary of Aging Management Evaluation

Table 3.3.2.1.19 Hydrogen & Oxygen Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Stainless Steel	Containment Atmosphere (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G, 3
			Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G, 3
Drain Trap (O2 Analyzers)	Leakage Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Filter Housing (O2 Analyzers)	Leakage Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Flexible Hose	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.19 Hydrogen & Oxygen Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Heat Exchangers (Air Cooled)	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E, 2
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1, 2
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 2
Moisture Separator (H2O2 Analyzers)	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Piping and fittings	Leakage Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E

Table 3.3.2.1.19 Hydrogen & Oxygen Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Structural Support	Stainless Steel	Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Pump Casing	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1

Table 3.3.2.1.19 Hydrogen & Oxygen Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Restricting Orifice	Pressure Boundary	Stainless Steel	Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Throttle	Stainless Steel	Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
Sensor Element	Pressure Boundary	Stainless Steel	Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Tanks (Volume Chamber)	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Valve Body	Leakage Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E

Table 3.3.2.1.19 Hydrogen & Oxygen Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Pressure Boundary	Copper Alloy	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 1
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Water Separator (O2 Analyzers)	Leakage Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects of the containment atmosphere (external) environment on stainless steel were applied to stainless steel with a containment atmosphere (internal) environment. The containment atmosphere environment aligns with the air - indoor uncontrolled GALL environment.
2. The air cooled heat exchanger is a coiled tube and is considered to be in the piping, piping component, and piping element component category.
3. The aging effect for stainless steel closure bolting in an indoor air or containment atmosphere (external) environment is loss of preload.

Table 3.3.2.1.20
Instrument (Control) Air System
Summary of Aging Management Evaluation

Table 3.3.2.1.20 Instrument (Control) Air System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 4
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-25 (AP-4)	3.3.1-80	E, 1
					None	VII.J-26 (AP-6)	3.3.1-79	A, 2
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.D-3 (A-80)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 3
		Stainless Steel	Containment Atmosphere (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
			Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)			G
				Loss Of Preload	Bolting Integrity (B.1.12)			G
Filter Housing	Pressure Boundary	Zinc	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)			F, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			F
	Structural Support	Stainless Steel	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-20 (AP-20)	3.3.1-80	E, 1

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter Housing	Structural Support	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
		Zinc	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)			F, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			F
Flexible Hose	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-20 (AP-20)	3.3.1-80	E, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Flow Element	Structural Support	Stainless Steel	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-20 (AP-20)	3.3.1-80	E, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Piping and fittings	Pressure Boundary	Brass	Containment Atmosphere (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-4 (AP-8)	3.3.1-80	E, 1
					None	VII.J-5 (AP-9)	3.3.1-79	A, 2

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 4
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-25 (AP-4)	3.3.1-80	E, 1
					None	VII.J-26 (AP-6)	3.3.1-79	A, 2
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.D-3 (A-80)	3.3.1-12	E
		Copper	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-4 (AP-8)	3.3.1-80	E, 1
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-20 (AP-20)	3.3.1-80	E, 1
					None	VII.J-21 (AP-22)	3.3.1-79	A, 2
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Structural Support	Brass	Containment Atmosphere (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-4 (AP-8)	3.3.1-80	E, 1
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 4
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-25 (AP-4)	3.3.1-80	E, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.D-3 (A-80)	3.3.1-12	E

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Structural Support	Copper	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-4 (AP-8)	3.3.1-80	E, 1
			Indoor Air (Internal)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-20 (AP-20)	3.3.1-80	E, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Valve Body	Pressure Boundary	Aluminum	Containment Atmosphere (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)			G, 1
					None	VII.J-2 (AP-37)	3.3.1-79	A, 2
			Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Brass	Containment Atmosphere (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-4 (AP-8)	3.3.1-80	E, 1
					None	VII.J-5 (AP-9)	3.3.1-79	A, 2
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 4
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-25 (AP-4)	3.3.1-80	E, 1
					None	VII.J-26 (AP-6)	3.3.1-79	A, 2
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.D-3 (A-80)	3.3.1-12	E
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-20 (AP-20)	3.3.1-80	E, 1
					None	VII.J-21 (AP-22)	3.3.1-79	A, 2
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Structural Support	Brass	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-4 (AP-8)	3.3.1-80	E, 1
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Bronze	Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-4 (AP-8)	3.3.1-80	E, 1
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 4
			Dry Gas (Internal)	None	Compressed Air Monitoring (B.1.17)	VII.J-25 (AP-4)	3.3.1-80	E, 1
					None	VII.J-26 (AP-6)	3.3.1-79	A, 2

Table 3.3.2.1.20 Instrument (Control) Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Structural Support	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.D-3 (A-80)	3.3.1-12	E
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A, 2
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The environment of dried gas was used for the Instrument Air system. The Compressed Air Monitoring program is applied to the Instrument Air system components to confirm the internal environment remains sufficiently dry to preclude aging effects.
2. Normal internal environment for instrument air components in the drywell and containment penetration piping components is N2 gas.
3. The aging effects for carbon steel closure bolting in an outdoor environment also includes loss of preload.
4. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.

Table 3.3.2.1.21
Main Fuel Oil Storage & Transfer System
Summary of Aging Management Evaluation

Table 3.3.2.1.21 Main Fuel Oil Storage & Transfer System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Flexible Hose	Leakage Boundary	Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-6 (AP-54)	3.3.1-54	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Flow Meter	Leakage Boundary	Cast Iron	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A

Table 3.3.2.1.21 Main Fuel Oil Storage & Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Meter	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-6 (AP-54)	3.3.1-54	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Pump Casing	Leakage Boundary	Cast Iron	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Sight Glasses	Leakage Boundary	Brass	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-3 (AP-44)	3.3.1-26	B

Table 3.3.2.1.21 Main Fuel Oil Storage & Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Glasses	Leakage Boundary	Brass	Fuel Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.H1-3 (AP-44)	3.3.1-26	A
			Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
Strainer Body	Leakage Boundary	Cast Iron	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-10 (A-30)	3.3.1-20	B
					One-Time Inspection (B.1.24)	VII.H1-10 (A-30)	3.3.1-20	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.1.22)	VII.H1-6 (AP-54)	3.3.1-54	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Table 3.3.2.1.22
Miscellaneous Floor and Equipment Drain System
Summary of Aging Management Evaluation

Table 3.3.2.1.22 Miscellaneous Floor and Equipment Drain System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Flexible Hose	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E

Table 3.3.2.1.22 Miscellaneous Floor and Equipment Drain System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.C1-19 (A-01)	3.3.1-18	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
	Pressure Boundary	Carbon and low alloy steel	Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C1-18 (A-32)	3.3.1-63	E, 1
Pump Casing (Lab Drain Tank Pump P-22-003)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E

Table 3.3.2.1.22 Miscellaneous Floor and Equipment Drain System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Laundry Drain Tank Pump P-22-002)	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
Pump Casings (Regeneration Waste Transfer Pumps P-22-28A,B and P-22-29A,B)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.22 Miscellaneous Floor and Equipment Drain System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Stainless Steel	Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
Tanks (Lab Drain Tank T-22-003)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E
Tanks (Laundry Drain Tank T-22-002)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
Tanks (Oil Separator DS-Y-105 and Oil Receiver DS-T-1)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
Tanks (Regeneration System Waste Tank 1-1 Low and High Conductivity Compartments)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.22 Miscellaneous Floor and Equipment Drain System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks (Regeneration System Waste Tank 1-1 Low and High Conductivity Compartments)	Leakage Boundary	Carbon and low alloy steel	Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.E4-17 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.E4-17 (AP-30)	3.3.1-16	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.22 Miscellaneous Floor and Equipment Drain System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The One-Time Inspection program confirms the absence of aging effects in pooled or potentially stagnant flow areas of drain piping and piping elements.

Table 3.3.2.1.23
Nitrogen Supply System
Summary of Aging Management Evaluation

Table 3.3.2.1.23 Nitrogen Supply System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1

Table 3.3.2.1.23 Nitrogen Supply System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Stainless Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 2
				Loss Of Preload	Bolting Integrity (B.1.12)			G
Drip Leg	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Heat Exchangers (Electric Heater)	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	C
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Heat Exchangers (Trim Heater)	Heat Transfer	Brass (vortex generators)	Dry Gas (External)	None	None	VII.J-5 (AP-9)	3.3.1-79	C
		Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	C

Table 3.3.2.1.23 Nitrogen Supply System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Trim Heater)	Heat Transfer	Stainless Steel	Encased	None	None			G, 4
	Pressure Boundary	Stainless Steel (Tubing)	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	C
			Encased	None	None			G, 4
Heat Exchangers (Vaporizer)	Heat Transfer	Aluminum	Dry Gas (Internal)	None	None	VII.J-2 (AP-37)	3.3.1-79	C
	Pressure Boundary	Aluminum	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
		Copper	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G

Table 3.3.2.1.23 Nitrogen Supply System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Pressure Building Coils	Pressure Boundary	Aluminum	Dry Gas (Internal)	None	None	VII.J-2 (AP-37)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Restricting Orifice	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Throttle	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
Rupture Disks	Pressure Boundary	Bronze	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A

Table 3.3.2.1.23 Nitrogen Supply System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Rupture Disks	Pressure Boundary	Bronze	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Sight Glasses (Flow Indication)	Pressure Boundary	Brass	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Glass	Dry Gas (Internal)	None	None			G, 3
			Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
Strainer	Filter	Bronze	Dry Gas (External)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
Strainer Body	Pressure Boundary	Bronze	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G

Table 3.3.2.1.23 Nitrogen Supply System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	C
			Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VII.H1-11 (A-95)	3.3.1-33	B
Thermowell	Pressure Boundary	Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
Valve Body	Pressure Boundary	Brass	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Bronze	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G
		Carbon and low alloy steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.23 Nitrogen Supply System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
		Stainless Steel	Condensation (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-5 (A-12)	3.3.1-23	E
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The Bolting Integrity program provides adequate aging management for the Loss of Preload aging effect for bolting in an outdoor air environment.
2. The aging effect for stainless steel in an outdoor air (external) environment is loss of material based on industry standards (EPRI Mechanical Tools Appendix E)
3. There are no aging effects for glass in a gas environment, based on other NUREG-1801 items for glass, such as VII.J-10 (AP-14) for glass in an indoor air environment.
4. There are no aging effects for stainless steel encased in aluminum, based on industry guidance.

Table 3.3.2.1.24
Noble Metals Monitoring System
Summary of Aging Management Evaluation

Table 3.3.2.1.24 Noble Metals Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-19 (A-34)	3.3.1-2	C, 2
				Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-19 (A-34)	3.3.1-2	C, 2
				Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E

Table 3.3.2.1.24 Noble Metals Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Piping and fittings	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E3-18 (A-60)	3.3.1-31	E, 1
					Water Chemistry (B.1.2)	VII.E3-18 (A-60)	3.3.1-31	E, 1
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-16 (A-62)	3.3.1-2	A, 2
				Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Sensor Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E

Table 3.3.2.1.24 Noble Metals Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The BWR Reactor Water Cleanup System program does not apply to piping and piping welds <4" nominal pipe size. Water Chemistry and the One-Time Inspection programs will be used to confirm that cracking/stress corrosion cracking/intergranular stress corrosion cracking is not occuring in piping and piping welds <4" nominal pipe size.
2. The Noble Metals Monitoring System is exposed to reactor temperature and pressure and is subject to cumulative fatigue.

Table 3.3.2.1.25
Post-Accident Sampling System
Summary of Aging Management Evaluation

Table 3.3.2.1.25 Post-Accident Sampling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
								B, 2
		Carbon and low alloy steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						V.E-4 (EP-25)	3.2.1-25	B

Table 3.3.2.1.25 Post-Accident Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
								B, 2
		Stainless Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C2-11 (R-18)	3.1.1-1	A
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 3
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C2-11 (R-18)	3.1.1-1	A
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 3
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.25 Post-Accident Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B, 1
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 7
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A

Table 3.3.2.1.25 Post-Accident Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 1
						IV.C1-2 (R-55)	3.1.1-21	B, 1
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.3.2.1.25 Post-Accident Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Structural Support	Stainless Steel	Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 4
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	V.D2-2 (E-26)	3.2.1-2	E
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 5, 6

Table 3.3.2.1.25 Post-Accident Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	V.D2-27 (E-08)	3.2.1-10	A
					Water Chemistry (B.1.2)	V.D2-27 (E-08)	3.2.1-10	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 5, 7
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 6
						IV.C1-2 (R-55)	3.1.1-21	E, 5, 6
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 6
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A

Table 3.3.2.1.25 Post-Accident Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD are not applicable to RCPB P.A.S.S. piping and components <= 1 in. N.P.S.
2. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
3. The aging effects for stainless steel closure bolting include loss of preload.
4. The aging effects of the containment atmosphere (external) environment on stainless steel were applied to stainless steel with a containment atmosphere (internal) environment. The containment atmosphere environment aligns with the air - indoor uncontrolled NUREG-1801 environment.
5. The applicable Aging Management Programs recommended in NUREG-1801 for Class 1 carbon and stainless steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 valve bodies < 4 in. N.P.S.
6. ASME XI Inservice Inspection, Subsections IWB, IWC, IWD does not apply to cracking of valves
7. Stress corrosion cracking and intergranular stress corrosion cracking of carbon and low alloy steels are not considered applicable aging mechanisms in a treated water environment per EPRI Mechanical Tools, Appendix A.

Table 3.3.2.1.26
Process Sampling System
Summary of Aging Management Evaluation

Table 3.3.2.1.26 Process Sampling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Coolers	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 2
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 2
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 2
Evaporator	Leakage Boundary	Copper	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.F1-13 (AP-34)	3.3.1-38	B

Table 3.3.2.1.26 Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Evaporator	Leakage Boundary	Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
Flexible Hose	Leakage Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.F2-7 (A-36)	3.3.1-10	E
			Treated Water <140F (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)	VII.A4-1 (A-16)	3.3.1-11	E
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B

Table 3.3.2.1.26 Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water < 140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C2-14 (A-25)	3.3.1-42	E, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
					One-Time Inspection (B.1.24)	VII.C2-9 (A-52)	3.3.1-39	E, 1
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Pump Casing	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Sensor Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.26 Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sensor Element	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Sight Glasses	Leakage Boundary	Glass	Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Treated Water <140F (Internal)	None	None	VII.J-15 (AP-51)	3.3.1-75	A
Tanks (Reservoir)	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Thermowell	Leakage Boundary	Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.26 Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The One-Time Inspection program confirms the absence of aging effects in stagnant flow areas.
2. Coolers that consist of coiled tubing are included in the component category of piping, piping components, and piping elements.

Table 3.3.2.1.27
Radiation Monitoring System
Summary of Aging Management Evaluation

Table 3.3.2.1.27 Radiation Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
		Stainless Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
Piping and fittings	Pressure Boundary	Stainless Steel	Containment Atmosphere (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
	Structural Support	Stainless Steel	Containment Atmosphere (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	A

Table 3.3.2.1.27 Radiation Monitoring System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Structural Support	Stainless Steel	Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
Valve Body	Pressure Boundary	Stainless Steel	Containment Atmosphere (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A
	Structural Support	Stainless Steel	Containment Atmosphere (Internal)	None	None	V.F-14 (EP-18)	3.2.1-35	A
			Indoor Air (External)	None	None	V.F-14 (EP-18)	3.2.1-35	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Table 3.3.2.1.28
Radwaste Area Heating and Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2.1.28 Radwaste Area Heating and Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 1
		Stainless Steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	A
Damper housing	Pressure Boundary	Aluminum	Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 2
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Galvanized Steel	Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 2
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Door Seal	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-9 (A-18)	3.3.1-28	E

Table 3.3.2.1.28 Radwaste Area Heating and Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Door Seal	Pressure Boundary	Elastomer	Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)			G
Ductwork	Pressure Boundary	Aluminum	Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 2
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Fan Housing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-2 (A-08)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.I-8 (A-78)	3.3.1-12	E
Flexible Connection	Pressure Boundary	Elastomer	Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F2-10 (A-17)	3.3.1-10	E
			Outdoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)			G

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.
2. Ventilation system components in the scope of license renewal at Oyster Creek are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal is "Indoor Air (Internal)."

Table 3.3.2.1.29
Reactor Building Closed Cooling Water System
Summary of Aging Management Evaluation

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Cleanup Auxiliary Pump)	Leakage Boundary	Carbon Steel (Pedestal Cooler)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	D, 11
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E, 11
		Cast Iron (Bearing Housing Cooler)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-7 (A-50)	3.3.1-43	D, 10
					Selective Leaching of Materials (B.1.25)	VII.C2-7 (A-50)	3.3.1-43	C, 10
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E, 10
		Stainless Steel (Seal Cooler)	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	D, 9
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C, 9
Coolers (Cleanup Pre-coat Pump)	Leakage Boundary	Carbon Steel (Shell Side Components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Cleanup Recirc. Pumps Lube Oil)	Leakage Boundary	Cast Iron (Tube Side Components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-7 (A-50)	3.3.1-43	D

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Cleanup Recirc. Pumps Lube Oil)	Leakage Boundary	Cast Iron (Tube Side Components)	Closed Cooling Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.C2-7 (A-50)	3.3.1-43	C
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Containment Spray Pump Room)	Leakage Boundary	Copper	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 6
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 6
Coolers (Core Spray Pump Room)	Leakage Boundary	Copper	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 6
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 6
Coolers (Drywell Cooling Units)	Leakage Boundary	Copper	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 6
			Containment Atmosphere (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 6
Coolers (Post Accident Sample)	Leakage Boundary	Copper	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 6

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Post Accident Sample)	Leakage Boundary	Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 6
Coolers (Sample)	Leakage Boundary	Copper	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 6
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 6
Coolers (Shutdown Cooling Pumps)	Heat Transfer	Cast Iron (Bearing Housing Cooler)	Closed Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System (B.1.14)			H, 1, 4, 10
			Lubricating Oil (External)	Reduction of Heat Transfer	Lubricating Oil Monitoring Activities (B.2.2)			H, 1, 10
		Copper (Seal Cooler Tubes)	Closed Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System (B.1.14)			H, 1, 4
			Treated Water (Internal)	Reduction of Heat Transfer	Water Chemistry (B.1.2)			G, 1, 4
	Pressure Boundary	Carbon Steel (Seal Cooler Shell Side Components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Shutdown Cooling Pumps)	Pressure Boundary	Cast Iron (Bearing Housing Cooler)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-7 (A-50)	3.3.1-43	D, 10
					Selective Leaching of Materials (B.1.25)	VII.C2-7 (A-50)	3.3.1-43	C, 10
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E, 10
			Lubricating Oil (External)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.C2-13 (AP-30)	3.3.1-16	E, 10
					One-Time Inspection (B.1.24)	VII.C2-13 (AP-30)	3.3.1-16	E, 10
		Copper (Seal Cooler Tubes and Tube Side Components)	Closed Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	D
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C2-5 (AP-64)	3.3.1-38	E, 5
					Water Chemistry (B.1.2)	VII.C2-5 (AP-64)	3.3.1-38	E, 5
Coolers (Tunnel)	Leakage Boundary	Copper	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 6

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Tunnel)	Leakage Boundary	Copper	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 6
Filter Housing	Leakage Boundary	Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Flow Element	Pressure Boundary	Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Gauge Snubber	Leakage Boundary	Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Pressure Boundary	Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Augmented Fuel Pool Cooling)	Heat Transfer	Stainless Steel (Plates)	Closed Cooling Water (Internal)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-2 (AP-63)	3.3.1-40	D, 7
			Treated Water (Internal)	Reduction of Heat Transfer	Water Chemistry (B.1.2)	VII.A4-4 (AP-62)	3.3.1-69	D, 7
	Pressure Boundary	Carbon Steel (Covers, Nozzles)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	D, 7
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E, 7
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-3 (S-18)	3.4.1-2	C, 7
					Water Chemistry (B.1.2)	VIII.E-3 (S-18)	3.4.1-2	D, 7
		Stainless Steel (Plates)	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.E4-2 (A-67)	3.3.1-41	D, 7

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Augmented Fuel Pool Cooling)	Pressure Boundary	Stainless Steel (Plates)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 7
			Treated Water < 140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-3 (A-70)	3.3.1-22	C, 7
					Water Chemistry (B.1.2)	VII.A4-3 (A-70)	3.3.1-22	D, 7
	Structural Support	Carbon Steel (Carrying Bars)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E, 7
				None	None	VII.J-17 (AP-17)	3.3.1-76	A, 7
Heat Exchangers (Cleanup Non-Regenerative)	Leakage Boundary	Carbon Steel (Shell Side Components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Drywell Equipment Drain Tank)	Leakage Boundary	Carbon Steel (Covers)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	D, 7
			Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 7, 8
		Stainless Steel (Nozzles, Plates)	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.E4-2 (A-67)	3.3.1-41	D, 7
			Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 7
	Structural Support	Stainless Steel (Carrying Bars)	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 7
Heat Exchangers (Fuel Pool Cooling)	Heat Transfer	Carbon Steel (Tubes)	Closed Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System (B.1.14)			G, 1, 4
			Treated Water (Internal)	Reduction of Heat Transfer	Water Chemistry (B.1.2)			G, 1, 4

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Fuel Pool Cooling)	Pressure Boundary	Carbon Steel (Shell Side Components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Carbon Steel (Tube Side Components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-3 (S-18)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.E-3 (S-18)	3.4.1-2	D
		Carbon Steel (Tubes)	Closed Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	D
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-3 (S-18)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.E-3 (S-18)	3.4.1-2	D

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Reactor Building Closed Cooling Water)								12
Heat Exchangers (Shutdown Cooling)	Heat Transfer	Stainless Steel (Tubes)	Closed Cooling Water (External)	Reduction of Heat Transfer	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-2 (AP-63)	3.3.1-40	B
			Treated Water (Internal)	Reduction of Heat Transfer	Water Chemistry (B.1.2)	VII.E3-6 (AP-62)	3.3.1-69	B
	Pressure Boundary	Carbon Steel (Shell Side Components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Carbon Steel (Tube Side Components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-3 (S-18)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.E-3 (S-18)	3.4.1-2	D

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Shutdown Cooling)	Pressure Boundary	Stainless Steel (Tube Sheet)	Treated Water <140F	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-3 (A-70)	3.3.1-22	A, 3
					Water Chemistry (B.1.2)	VII.A4-3 (A-70)	3.3.1-22	B, 3
		Stainless Steel (Tubes)	Closed Cooling Water <140F (External)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.E4-2 (A-67)	3.3.1-41	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-3 (A-70)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-3 (A-70)	3.3.1-22	B
Level Glass	Leakage Boundary	Copper Alloy	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Glass	Closed Cooling Water (Internal)	None	None			G, 1

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Level Glass	Leakage Boundary	Glass	Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
					One-Time Inspection (B.1.24)	VII.C2-14 (A-25)	3.3.1-42	E, 2
			Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 8
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Cast Iron	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-7 (A-50)	3.3.1-43	B
					One-Time Inspection (B.1.24)	VII.C2-7 (A-50)	3.3.1-43	E, 2
					Selective Leaching of Materials (B.1.25)	VII.C2-7 (A-50)	3.3.1-43	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C2-9 (A-52)	3.3.1-39	E, 2
			Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
					One-Time Inspection (B.1.24)	VII.C2-14 (A-25)	3.3.1-42	E, 2
			Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 8
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.G-22 (A-01)	3.3.1-18	B
		Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
					One-Time Inspection (B.1.24)	VII.C2-9 (A-52)	3.3.1-39	E, 2

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Pump Casing (Chemical Feed Pump)	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Pump Casing (RBCCW Pumps)	Pressure Boundary	Cast Iron	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-7 (A-50)	3.3.1-43	B
					Selective Leaching of Materials (B.1.25)	VII.C2-7 (A-50)	3.3.1-43	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Rupture Disks	Leakage Boundary	Aluminum	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)			G, 1
			Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Tanks (Chemical Mixing Tank)	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Tanks (RBCCW Surge Tank)	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Thermowell	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Valve Body	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 8
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Copper Alloy	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B
				Loss of Material	Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	A
			Containment Atmosphere (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
	Pressure Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 8
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Copper Alloy	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B
				Loss of Material	Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Stainless Steel	Closed Cooling Water <140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B

Table 3.3.2.1.29 Reactor Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for this material/environment combination are consistent with industry standards.
2. The One-Time Inspection program confirms the absence of aging effects in stagnant flow areas.
3. The tube sheet is carbon steel with stainless steel overlay. The carbon steel side of the tube sheet is evaluated with the shell side components.
4. The aging effects for this material/environment combination are managed by the Water Chemistry or Closed-Cycle Cooling Water System programs.
5. The Closed-Cycle Cooling Water System program does not apply to a treated water environment. The appropriate programs for managing the identified aging effects in a treated water environment are Water Chemistry and One-Time Inspection.
6. Coolers that consist only of coiled tubing or rows of tubing are included in the component category of piping, piping components, and piping elements.
7. Heat exchanger is a plate type heat exchanger consisting of plates, covers, nozzles, and carrying bars.
8. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any

practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.

9. The cooling water channel is integral to the seal housing. For the Leakage Boundary intended function, only the indoor air external environment is considered.
10. The cooling water channel is integral to the bearing housing. For the Heat Transfer intended function, only the lube oil external environment is considered. For the Pressure Boundary intended function, both the lube oil and indoor air external environments are considered. For the Leakage Boundary intended function, only the indoor air external environment is considered.
11. The cooling water channel is integral to the pump pedestal.
12. The Reactor Building Closed Cooling Water Heat Exchangers are evaluated with the Service Water System.

Table 3.3.2.1.30
Reactor Building Floor and Equipment Drains
Summary of Aging Management Evaluation

Table 3.3.2.1.30 Reactor Building Floor and Equipment Drains

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-1 (SP-52)	3.4.1-11	E

Table 3.3.2.1.30 Reactor Building Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C1-18 (A-32)	3.3.1-63	E, 1
		Cast Iron	Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C1-18 (A-32)	3.3.1-63	E, 1
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
		Stainless Steel	Concrete (External)	None	None	VII.J-19 (AP-19)	3.3.1-78	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C3-8 (A-53)	3.3.1-61	E, 1

Table 3.3.2.1.30 Reactor Building Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (RBEDT pump)	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
Tanks (RBEDT)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A

Table 3.3.2.1.30 Reactor Building Floor and Equipment Drains (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C1-18 (A-32)	3.3.1-63	E, 1
		Cast Iron	Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	A
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C1-18 (A-32)	3.3.1-63	E, 1
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The One-Time Inspection program confirms the absence of aging effects in pooled or potentially stagnant flow areas of drain piping and piping elements.

Table 3.3.2.1.31
Reactor Building Ventilation System
Summary of Aging Management Evaluation

Table 3.3.2.1.31 Reactor Building Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Aluminum	Indoor Air (External)	None	None			F, 5
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 3
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 3
		Stainless Steel	Indoor Air (External)	None	None			G, 5
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	A
Closure bolting (Containment Isolation Components)	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B, 2
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	E, 2
Damper housing	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C

Table 3.3.2.1.31 Reactor Building Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper housing	Pressure Boundary	Aluminum	Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 6
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Galvanized Steel	Concrete (External)	None	None			G, 1
			Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 6
Door Seal	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-7 (A-36)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-8 (A-73)	3.3.1-28	E
			Indoor Air (Internal)	Change in Material Properties	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-10 (A-17)	3.3.1-10	E
				Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-9 (A-18)	3.3.1-28	E
Ductwork	Pressure Boundary	Aluminum	Concrete (External)	None	None			F, 1

Table 3.3.2.1.31 Reactor Building Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	C, 6
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Galvanized Steel	Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Indoor Air (Internal)	None	None	VII.J-8 (AP-13)	3.3.1-74	C, 6
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-1 (A-10)	3.3.1-16	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.F3-6 (A-11)	3.3.1-16	E, 6
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 6
Piping and fittings (Primary Containment Isolation Valves)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	None	None	VII.F3-6 (A-11)	3.3.1-16	I, 4

Table 3.3.2.1.31 Reactor Building Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings (Primary Containment Isolation Valves)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	VII.F3-6 (A-11)	3.3.1-16	E, 6
					One-Time Inspection (B.1.24)	VII.F3-6 (A-11)	3.3.1-16	E, 6
Sensor Element (Temperature)	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C
			Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	C, 6
Valve Body	Pressure Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	Periodic Inspection of Ventilation Systems (B.2.4)	VII.I-7 (A-77)	3.3.1-12	E, 6
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Indoor Air (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	A, 6

Table 3.3.2.1.31 Reactor Building Ventilation System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body (Primary Containment Isolation)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	None	None	VII.F3-6 (A-11)	3.3.1-16	I, 4
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Cast Iron	Containment Atmosphere (Internal)	None	None	VII.F3-6 (A-11)	3.3.1-16	I, 4
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effect for galvanized steel and aluminum encased in concrete is none. This is consistent with industry guidance.
2. The Bolting Integrity program adequately manages the aging effects of the bolting used with Primary Containment components.
3. Ventilation system duct bolting is similar to structural bolting in that it provides structural support for ventilation system assemblies, which is functionally different from piping system pressure retaining closure bolting. The Bolting Integrity program does not provide for long-term condition monitoring inspections of ventilation duct bolting. Therefore, the Structures Monitoring Program is appropriate to detect and manage the aging effects of ventilation system duct bolting by periodic visual inspection.
4. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
5. The aging effects for stainless steel ventilation closure bolting in an indoor environment is none. This is consistent with industry guidance.

6. Ventilation system components in the scope of license renewal at Oyster Creek are not subject to internal condensation. A review of the maintenance history of these components has not identified degradation due to the presence of internal condensation. Preventive maintenance activities and system manager walkdowns have not identified or reported internal condensation or resulting internal ventilation system degradation in these components. Therefore, the internal environment for ventilation system components in the scope of license renewal is "Indoor Air (Internal)."

Table 3.3.2.1.32
Reactor Water Cleanup System
Summary of Aging Management Evaluation

Table 3.3.2.1.32 Reactor Water Cleanup System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 1
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-19 (A-34)	3.3.1-2	C, 10
						IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 1

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 1
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-19 (A-34)	3.3.1-2	C, 10
						IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 1
						VII.I-5 (AP-26)	3.3.1-35	B

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Cleanup Pre-coat Pump)	Leakage Boundary	Stainless Steel (Tube Side Components)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-3 (A-70)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-3 (A-70)	3.3.1-22	B
Coolers (Cleanup Recirc. Pumps Lube Oil)	Leakage Boundary	Carbon Steel (Shell Side Components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-3 (AP-39)	3.3.1-21	E
					One-Time Inspection (B.1.24)	VII.H2-3 (AP-39)	3.3.1-21	E
Demineralizer (Cleanup Demineralizer)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Filter Housing (Cleanup Filter)	Leakage Boundary	Carbon Steel (with elastomer lining)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter Housing (Cleanup Filter)	Leakage Boundary	Carbon Steel (with elastomer lining)	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-12 (A-40)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-12 (A-40)	3.3.1-22	B
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Gauge Snubber	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Heat Exchangers (Cleanup Non-Regenerative)	Leakage Boundary	Stainless Steel (Tube Side Components)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Cleanup Non-Regenerative)	Leakage Boundary	Stainless Steel (Tube Side Components)	Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E3-4 (A-71)	3.3.1-6	E
					Water Chemistry (B.1.2)	VII.E3-4 (A-71)	3.3.1-6	E
				Loss of Material	One-Time Inspection (B.1.24)	VII.A4-3 (A-70)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-3 (A-70)	3.3.1-22	B
Heat Exchangers (Cleanup Regenerative)	Leakage Boundary	Stainless Steel (Shell Side Components)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E3-20 (A-85)	3.3.1-6	E
					Water Chemistry (B.1.2)	VII.E3-20 (A-85)	3.3.1-6	E
				Loss of Material	One-Time Inspection (B.1.24)	VIII.E-2 (S-21)	3.4.1-10	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Cleanup Regenerative)	Leakage Boundary	Stainless Steel (Shell Side Components)	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.E-2 (S-21)	3.4.1-10	B
		Stainless Steel (Tube Side Components)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E3-20 (A-85)	3.3.1-6	E
					Water Chemistry (B.1.2)	VII.E3-20 (A-85)	3.3.1-6	E
				Loss of Material	One-Time Inspection (B.1.24)	VII.A4-3 (A-70)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-3 (A-70)	3.3.1-22	B
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.H2-10 (AP-47)	3.3.1-24	E
					One-Time Inspection (B.1.24)	VII.H2-10 (AP-47)	3.3.1-24	E
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Reactor Water Cleanup System (B.1.18)	VII.E3-18 (A-60)	3.3.1-31	B
					One-Time Inspection (B.1.24)	VII.E3-18 (A-60)	3.3.1-31	E, 2
					Water Chemistry (B.1.2)	VII.E3-18 (A-60)	3.3.1-31	E, 2
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-16 (A-62)	3.3.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-16 (A-62)	3.3.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 8
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	VII.F3-6 (A-11)	3.3.1-16	E, 3
					One-Time Inspection (B.1.24)	VII.F3-6 (A-11)	3.3.1-16	E, 3
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A, 9
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B, 9
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 11
			Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A, 6
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B, 6
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-9 (R-22)	3.1.1-32	E, 4
					BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)		3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Pump Casing (Cleanup Auxiliary Pump)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Cleanup Auxiliary Pump)	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Pump Casing (Cleanup Filter Aid Pumps)	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Selective Leaching of Materials (B.1.25)	VII.E3-14 (AP-31)	3.3.1-67	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Pump Casing (Cleanup Filter Precoat Pump)	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Selective Leaching of Materials (B.1.25)	VII.E3-14 (AP-31)	3.3.1-67	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Cleanup Recirc Pumps)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Pump Casing (Cleanup Sludge Pump)	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Selective Leaching of Materials (B.1.25)	VII.E3-14 (AP-31)	3.3.1-67	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Restricting Orifice	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sensor Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Sight Glasses	Leakage Boundary	Carbon and low alloy steel (Body)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Glass (Window)	Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Treated Water <140F (Internal)	None	None			G, 5
		Stainless Steel (Body)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Glasses	Leakage Boundary	Stainless Steel (Body)	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Tanks (Cleanup Backwash Tank)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks (Cleanup Filter Aid Mix Tank)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Tanks (Cleanup Filter and Precoat Tank)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Tanks (Cleanup Filter Sludge Receiver)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Tanks (Cleanup Recirc. Pump Surge Tank)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks (Cleanup Recirc. Pump Surge Tank)	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Tanks (Cleanup Recirc. Pumps Lube Oil)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.C2-13 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.C2-13 (AP-30)	3.3.1-16	E
Thermowell	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		CASS	Indoor Air (External)	None	None	VII.J-3 (AP-7)	3.3.1-76	A
			Treated Water >482F (Internal)	Loss of Fracture Toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-4 (R-08)	3.1.1-47	B, 12
				Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Selective Leaching of Materials (B.1.25)	VII.E3-14 (AP-31)	3.3.1-67	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Copper Alloy	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.K-1 (AP-70)	3.3.1-23	E
					Selective Leaching of Materials (B.1.25)	VII.E3-13 (AP-32)	3.3.1-65	A
					Water Chemistry (B.1.2)	VII.K-1 (AP-70)	3.3.1-23	E
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	VII.F3-6 (A-11)	3.3.1-16	E, 3
					One-Time Inspection (B.1.24)	VII.F3-6 (A-11)	3.3.1-16	E, 3
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		CASS	Containment Atmosphere (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-1 (RP-02)	3.1.1-71	A
			Treated Water >482F (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-10 (R-20)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 7, 14
						IV.C1-2 (R-55)	3.1.1-21	E, 13, 14
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 7, 14
						IV.C1-10 (R-20)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Fracture Toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-4 (R-08)	3.1.1-47	B

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	CASS	Treated Water >482F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 7, 14
						IV.C1-2 (R-55)	3.1.1-21	E, 13, 14
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 7, 14
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A

Table 3.3.2.1.32 Reactor Water Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E3-17 (AP-57)	3.3.1-23	E
					Water Chemistry (B.1.2)	VII.E3-17 (AP-57)	3.3.1-23	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
2. The BWR Reactor Water Cleanup System program does not apply to piping and piping welds <4" nominal pipe size. Water Chemistry and the One-Time Inspection programs will be used to confirm that cracking/stress corrosion cracking/intergranular stress corrosion cracking is not occuring in piping and piping welds <4" nominal pipe size.
3. The internal environment for the outlet of the system relief valve and for the non-submerged portion of the relief valve discharge piping is indoor air since these components are vented and drained from within the Reactor Building.
4. The program for ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD is applied to this component in addition to the NUREG-1801 specified programs.
5. Glass has no aging effects in a treated water environment based on industry standards.
6. The open ended demineralizer line relief valve discharge pipe is submerged in the Suppression Pool.
7. The applicable program for the aging effect of cracking as identified in line item IV.C1-1 (R-03) for class 1 piping, fittings and branch connections < NPS 4 has been applied to valves < NPS 4.
8. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due

to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.

9. The RWCU carbon steel bottom head drain line is not susceptible to FAC. The wear factor from temperature is a bell curve that peaks around 300 F to 325 F. At the almost 500 F that this line sees, the oxide layer is more stable. Additionally, for this 2" line, operating flow of 6 GPM (ref. calc. No. C-1302-215-5360-004) provides a velocity of ~1 ft/sec. Flow rates less than 6 ft/sec do not need to be considered for flow-accelerated corrosion.
10. The aging effect of cumulative fatigue damage has been applied to non-Class 1 closure bolting. It does not apply to the Cleanup Aux. Pump closure bolting since this pump is isolated during power operations. It also does not apply to the Cleanup Recirc. Pumps, or, to any other system component that is located in the low pressure/low temperature portion of the Reactor Water Cleanup System.
11. SCC and IGSCC of carbon and low alloy steel are not considered applicable aging mechanisms in a treated water environment per EPRI Mechanical Tools Appendix A.
12. The aging effect of loss of fracture toughness (IV.C1-4 for Class 1 valve bodies) has been applied to the non-Class 1 cast stainless steel valve bodies in the Reactor Water Cleanup System exposed to treated water >482F.
13. The applicable program for the aging effect of cracking as identified in line item IV.C1-2 (R-55) for class 1 piping, fittings and branch connections < NPS 4 has been applied to valves < NPS 4.
14. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to valve bodies.

Table 3.3.2.1.33
Roof Drains and Overboard Discharge
Summary of Aging Management Evaluation

Table 3.3.2.1.33 Roof Drains and Overboard Discharge

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Soil (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 1
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 1
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E

Table 3.3.2.1.33 Roof Drains and Overboard Discharge (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Bronze	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A, 2, 3
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)			G, 2, 4
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E, 5
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.J-2 (SP-51)	3.4.1-6	E, 5
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A, 3
		Carbon and low alloy steel (w/coating or wrapping)	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.C1-19 (A-01)	3.3.1-18	B, 6
		Polymers	Raw Water - Salt Water (Internal)	None	None			F, 3, 7

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for closure bolting in a buried (soil) external environment include loss of material and loss of preload. External inspections of buried bolting will occur in accordance with the frequency outlined in the Buried Piping Inspection program.
2. Material is bronze ASTM designation B61 which contains < 15% Zn, therefore, the aging mechanism of selective leaching does not apply.
3. The aging effects associated with the continuous Raw Water - Salt Water internal environment (ESW/SW) bound the aging effects associated with intermittent Raw Water - Fresh Water effluents (building sumps, drains, and storm water effluents) which are released through the Overboard Discharge Line.
4. The aging effect for bronze in a buried (soil) external environment includes loss of material (reference: EPRI Mechanical Tools Appendix E).
5. Applies to the portion of the Office Building roof drain system relied upon for drainage of Fire Protection System deluge spray from the New Cable Spreading Room floor drains.
6. Exterior coating or wrapping is applied to all carbon steel piping and fittings that are exposed to a soil (external) environment.
7. Except for a 6' spool piece, the 30" Overboard Discharge line has a polyester resin liner (Insituform) on the internal diameter. Polyester resin is chemically resistant, with superior water resistance, and has no aging effects for the identified environment based on industry experience.

Table 3.3.2.1.34
Sanitary Waste System
Summary of Aging Management Evaluation

Table 3.3.2.1.34 Sanitary Waste System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Fresh Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C3-10 (A-31)	3.3.1-62	E, 2
					Selective Leaching of Materials (B.1.25)	VII.C1-12 (AP-29)	3.3.1-67	A
		Polyvinyl Chloride (PVC, CPVC)	Indoor Air (External)	None	None			F, 1
			Raw Water – Fresh Water (Internal)	None	None			F, 1

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Polyvinyl Chloride (PVC, CPVC) has no aging effects for identified environment based on industry standards.
2. NUREG-1801 only addresses selective leaching aging mechanism for this component and environment. VII.C3-10 (A-31) uses Aging Management Program Open-Cycle Cooling Water System however, this system has a Raw Water - Fresh Water environment. One-Time Inspection program will be used to confirm loss of material due to other potential mechanisms.

Table 3.3.2.1.35
Service Water System
Summary of Aging Management Evaluation

Table 3.3.2.1.35 Service Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1
			Raw Water – Salt Water (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 13
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 13
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-1 (AP-28)	3.3.1-36	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 1

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Raw Water – Salt Water (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 13
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 13
			Soil (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 3
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 3
		Stainless Steel	Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)			G, 2
				Loss Of Preload	Bolting Integrity (B.1.12)			G, 2
Eductor	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Expansion Joint	Pressure Boundary	Elastomer	Outdoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 9
			Raw Water – Salt Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)			G, 9

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Heat Exchangers (RBCCW)	Heat Transfer	Titanium (Tubes)	Closed Cooling Water (External)	None	None			F, 4
			Raw Water – Salt Water (Internal)	Reduction of Heat Transfer	Open-Cycle Cooling Water System (B.1.13)			F, 4
	Pressure Boundary	Carbon Steel (Shell Side Components)	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Carbon Steel (Tube Side Components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-3 (A-64)	3.3.1-63	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (RBCCW)	Pressure Boundary	Titanium (Tube Sheet)	Raw Water – Salt Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)			F, 4, 10
		Titanium (Tubes)	Closed Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)			F, 4
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)			F, 4
Heat Exchangers (TBCCW)	Leakage Boundary	Carbon and low alloy steel (Tube Side Components)	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-3 (A-64)	3.3.1-63	A
Piping and fittings	Leakage Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A, 12
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A, 12
		Bronze	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Bronze	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A, 11
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
	Pressure Boundary	Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 5
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A, 12
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A, 12
		Bronze	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Bronze	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 5
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A, 11
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.G-20 (AP-30)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.G-20 (AP-30)	3.3.1-16	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Carbon and low alloy steel (w/coating or wrapping)	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.C1-19 (A-01)	3.3.1-18	B, 14
		Copper Alloy	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.C1-6 (AP-47)	3.3.1-24	E
					One-Time Inspection (B.1.24)	VII.C1-6 (AP-47)	3.3.1-24	E

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Copper Alloy	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 5
		Polyvinyl Chloride (PVC, CPVC)	Outdoor Air (External)	None	None			F, 6
			Raw Water – Salt Water (Internal)	None	None			F, 6
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Lubricating Oil (Internal)	None	None	V.F-18 (EP-21)	3.2.1-34	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Pump Casing (Rad Monitor Sample Pump)	Pressure Boundary	Stainless Steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Pump Casing (Service Water Pumps)	Pressure Boundary	Bronze (Bowl Assembly)	Raw Water – Salt Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Service Water Pumps)	Pressure Boundary	Bronze (Bowl Assembly)	Raw Water – Salt Water (External)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Cast Iron (Discharge Head and Bowl Assembly)	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Salt Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
		Stainless Steel (Column Pipe)	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Service Water Pumps)	Pressure Boundary	Stainless Steel (Column Pipe)	Raw Water – Salt Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Restricting Orifice	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
	Throttle	Stainless Steel	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Rotameter	Pressure Boundary	Stainless Steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Sample Chamber	Pressure Boundary	Titanium	Outdoor Air (External)	None	None			F, 4
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)			F, 4
Sight Glasses	Leakage Boundary	Copper Alloy (Body)	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Glasses	Leakage Boundary	Copper Alloy (Body)	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Glass (Window)	Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
			Raw Water – Salt Water (Internal)	None	None			G, 7
		Stainless Steel (Body)	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Strainer	Filter (Rad Monitor Duplex Strainer)	Polyvinyl Chloride (PVC, CPVC)	Raw Water – Salt Water (External)	None	None			F, 6
Strainer Body	Leakage Boundary	Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
	Pressure Boundary (Rad Monitor Duplex Strainer)	Polyvinyl Chloride (PVC, CPVC)	Outdoor Air (External)	None	None			F, 6
			Raw Water – Salt Water (Internal)	None	None			F, 6
Tanks (Service Water Pump Oil Reservoir)	Pressure Boundary	Aluminum	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)			G, 8
					One-Time Inspection (B.1.24)			G, 8
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
Thermowell	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure Boundary	Stainless Steel	Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
		Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A
	Pressure Boundary	Aluminum	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)			G, 8
					One-Time Inspection (B.1.24)			G, 8

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Aluminum	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.C1-19 (A-01)	3.3.1-18	B
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-8 (A-78)	3.3.1-12	E
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-18 (A-32)	3.3.1-63	A
					Selective Leaching of Materials (B.1.25)	VII.C1-9 (A-51)	3.3.1-67	A
		Copper Alloy	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.35 Service Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Copper Alloy	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VII.C1-6 (AP-47)	3.3.1-24	E
					One-Time Inspection (B.1.24)	VII.C1-6 (AP-47)	3.3.1-24	E
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)			G, 5
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-7 (A-44)	3.3.1-57	A
					Selective Leaching of Materials (B.1.25)	VII.C1-8 (A-47)	3.3.1-65	A
		Polyvinyl Chloride (PVC, CPVC)	Outdoor Air (External)	None	None			F, 6
			Raw Water – Salt Water (Internal)	None	None			F, 6
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Raw Water – Salt Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.1.13)	VII.C1-15 (A-54)	3.3.1-58	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for carbon and alloy steel closure bolting in an outdoor air (external) environment also include loss of preload.
2. The aging effects for stainless steel closure bolting in an outdoor air (external) environment include loss of material and loss of preload.
3. The aging effects for carbon and alloy steel closure bolting in a soil (external) environment include loss of material and loss of preload. External inspections of buried bolting will occur in accordance with the frequency outlined in the Buried Piping Inspection program.
4. Titanium not addressed in NUREG-1801. Aging effects are based on industry standards (EPRI Mechanical Tools Appendices B, E, and G).
5. The aging effect for copper or copper alloy (brass/bronze) in an outdoor air (external) environment is loss of material based on industry standards (EPRI Mechanical Tools Appendix E).
6. Polyvinyl Chloride (PVC, CPVC) has no aging effects for identified environment based on industry standards. Polyvinyl Chloride components with an outdoor air (external) environment are insulated and are not subject to aging effects from UV radiation.
7. Glass has no aging effects in this environment based on industry standards.
8. The aging effect for aluminum with a lubricating oil (internal) environment is based on industry standards (EPRI Mechanical Tools Appendix C) and assumes the potential for water pooling/separation in the oil reservoir.
9. The Structures Monitoring Program includes external surface inspections but does not include internal surface inspections. The Periodic Inspection Program will inspect this component for internal aging effects.

10. Tube sheets are carbon steel with titanium clad on tube side surface. The carbon steel side of the tube sheets are evaluated with the shell side components.
11. Material is bronze ASTM designation B61 which contains < 15% Zn, therefore, the aging mechanism of selective leaching does not apply.
12. Material is red brass ASTM designation B43 which contains > 15% Zn, therefore, the aging mechanism of selective leaching applies.
13. The aging effects for carbon and alloy steel closure bolting in a raw water - salt water (external) environment include loss of material and loss of preload.
14. Exterior coating or wrapping is applied to all carbon steel piping and fittings that are exposed to a soil (external) environment.

Table 3.3.2.1.36
Shutdown Cooling System
Summary of Aging Management Evaluation

Table 3.3.2.1.36 Shutdown Cooling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						V.E-4 (EP-25)	3.2.1-25	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						V.E-5 (EP-24)	3.2.1-25	B, 8
		Carbon and low alloy steel	Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						V.E-4 (EP-25)	3.2.1-25	B

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B
						V.E-5 (EP-24)	3.2.1-25	B, 8
		Stainless Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C2-11 (R-18)	3.1.1-1	A, 7
				Loss Of Preload	Bolting Integrity (B.1.12)			G
Coolers (Shutdown Cooling Pumps)								14
Flow Element	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B, 13
						IV.C1-2 (R-55)	3.1.1-21	E, 2, 11, 13
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A, 13

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 2, 12, 13
		Stainless Steel	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 13
						IV.C1-2 (R-55)	3.1.1-21	B, 13
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A, 13
						IV.C1-2 (R-55)	3.1.1-21	A, 13

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B, 13
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Heat Exchangers (Shutdown Cooling)								15
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 4
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B
						IV.C1-2 (R-55)	3.1.1-21	E, 2, 11
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
					TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E4-18 (A-37)	3.3.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B, 9
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 2, 12
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
						VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B
						IV.C1-9 (R-22)	3.1.1-32	E, 1
					BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
						VII.E4-14 (A-62)	3.3.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Pump Casing	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Restricting Orifice	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Restricting Orifice	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Throttle	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Thermowell	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 5, 10
						IV.C1-2 (R-55)	3.1.1-21	E, 6, 10
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 5, 6, 12

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
						VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Cracking Initiation and Growth	BWR Stress Corrosion Cracking (B.1.7)	IV.C1-9 (R-22)	3.1.1-32	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 10
						IV.C1-2 (R-55)	3.1.1-21	E, 5, 10
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 5, 10
						IV.C1-9 (R-22)	3.1.1-32	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A

Table 3.3.2.1.36 Shutdown Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The program for ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD is applied in addition to the NUREG-1801 recommended programs for this item.
2. The Aging Management Programs recommended in NUREG-1801 for Class 1 carbon steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 piping, fittings, and branch connections >= 4 in. N.P.S.
3. The One-Time Inspection program is used for piping and elements <4 in. n.p.s., in lieu of the BWR Stress Corrosion Cracking program (used for piping and elements >= 4 in. n.p.s.).
4. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
5. The applicable Aging Management Programs recommended in NUREG-1801 for Class 1 carbon and stainless steel piping, fittings, and branch

connections < 4 in. N.P.S. are also specified here for Class 1 valve bodies < 4 in. N.P.S.

6. The applicable Aging Management Programs recommended in NUREG-1801 for Class 1 carbon and stainless steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 valve bodies >= 4 in. N.P.S.
7. Cumulative Fatigue Damage (TLAA) is not included in NUREG-1801 as an aging effect for stainless steel bolting in BWRs. The bolting fatigue issue is addressed by TLAA, evaluated in accordance with 10CFR54.21(c).
8. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
9. Line item IV.C1-7 (R-23) for flow accelerated corrosion is not an applicable aging mechanism as this is a standby system.
10. ASME XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to cracking of these items.
11. This item is comprised of piping >= 4 in. N.P.S., therefore ASME XI Inservice Inspection, Subsections IWB, IWC, and IWD applies and One-Time Inspection is not required.
12. Stress corrosion cracking and intergranular stress corrosion cracking of carbon and low alloy steels are not considered applicable aging mechanisms in a treated water environment per EPRI Mechanical Tools, Appendix A.
13. Flow elements consist of carbon steel piping both < 4 in. N.P.S. and >= 4 in. N.P.S., and stainless steel piping and tubing < 4 in. N.P.S.
14. The Shutdown Cooling Pumps seal coolers and bearing housing coolers are evaluated with the Reactor Building Closed Cooling Water System.
15. The Shutdown Cooling Heat Exchangers are evaluated with the Reactor Building Closed Cooling Water System.

Table 3.3.2.1.37
Spent Fuel Pool Cooling System
Summary of Aging Management Evaluation

Table 3.3.2.1.37 Spent Fuel Pool Cooling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
			Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
		Stainless Steel	Containment Atmosphere (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
			Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
Diffuser	Direct Flow	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Indoor Air (Internal)	None	None	V.F-2 (EP-3)	3.2.1-32	A

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Diffuser	Direct Flow	Aluminum	Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	B
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	B
	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	B

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers (Augmented Fuel Pool Cooling and Fuel Pool Cooling)								3
Piping and fittings	Leakage Boundary	Aluminum	Concrete (External)	None	None			G, 1
			Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)			G
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	B
		Carbon and low alloy steel	Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	A
			Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 2
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-6 (A-11)	3.3.1-16	E
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)	VII.C1-19 (A-01)	3.3.1-18	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	B
	Pressure Boundary	Aluminum	Concrete (External)	None	None			G, 1
			Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	A

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Aluminum	Treated Water < 140F (External)	Loss of Material	Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Concrete (External)	None	None	VII.J-19 (AP-19)	3.3.1-78	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	B

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (Fuel Pool Cooling Pumps & Augmented Fuel Pool Cooling Pumps)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.A4-10 (AP-31)	3.3.1-67	A
Thermowells	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowells	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Valve Body	Leakage Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	B
		Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 2
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	B
	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-5 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.A4-5 (AP-38)	3.3.1-15	B
		Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.I-7 (A-77)	3.3.1-12	I, 2
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.37 Spent Fuel Pool Cooling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	B

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effect for aluminum encased in concrete is none. This is consistent with industry guidance.
2. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant’s identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
3. The Augmented Fuel Pool Cooling Heat Exchanger and the Fuel Pool Cooling Heat Exchanger are evaluated with the Reactor Building Closed Cooling Water System.

Table 3.3.2.1.38
Standby Liquid Control System (Liquid Poison System)
Summary of Aging Management Evaluation

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	Pressure Boundary	Alloy Steel	Dry Gas (Internal)	None	None	VII.J-26 (AP-6)	3.3.1-79	A, 5
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-12 (A-40)	3.3.1-22	A, 5
					Water Chemistry (B.1.2)	VII.A4-12 (A-40)	3.3.1-22	B, 5
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B
				Loss of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
						VII.I-5 (AP-26)	3.3.1-35	B
		Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VII.I-4 (AP-27)	3.3.1-35	B

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 2
						VII.I-5 (AP-26)	3.3.1-35	B
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 4
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 4
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Copper	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
						VII.J-17 (AP-17)	3.3.1-76	A
			Sodium Pentaborate (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E2-1 (A-59)	3.3.1-4	A, 6
					Water Chemistry (B.1.2)	VII.E2-1 (A-59)	3.3.1-4	B, 6
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 1, 6

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Sodium Pentaborate (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 1, 6
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Structural Support	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Pump Casing	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Tanks (Liquid Poison Tank)	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Sodium Pentaborate (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E2-1 (A-59)	3.3.1-4	A, 6
					Water Chemistry (B.1.2)	VII.E2-1 (A-59)	3.3.1-4	B, 6
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 1, 6
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 1, 6
Tanks (Liquid Poison Test Tank)	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Thermowell	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure Boundary	Stainless Steel	Sodium Pentaborate (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E2-1 (A-59)	3.3.1-4	A, 6
					Water Chemistry (B.1.2)	VII.E2-1 (A-59)	3.3.1-4	B, 6
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 1, 6
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 1, 6
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Brass	Dry Gas (Internal)	None	None	VII.J-5 (AP-9)	3.3.1-79	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
						VII.J-17 (AP-17)	3.3.1-76	A
			Sodium Pentaborate (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VII.E2-1 (A-59)	3.3.1-4	A, 6
					Water Chemistry (B.1.2)	VII.E2-1 (A-59)	3.3.1-4	B, 6
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A, 1, 6
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B, 1, 6

Table 3.3.2.1.38 Standby Liquid Control System (Liquid Poison System) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 3, 7
					One-Time Inspection (B.1.24)	IV.C2-2 (R-03)	3.1.1-9	E, 3, 7
						IV.C2-2 (R-55)	3.1.1-21	E, 3, 7
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The Aging Management Programs for the aging effect of "Loss of Material" in the Treated Water environment identified in the referenced NUREG-1801 Volume 2 Item column were applied to the Sodium Pentaborate environment since Sodium Pentaborate approximates Treated Water in aggressivity as identified in NUREG-1801 Volume 2 Chapter IX.
2. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
3. The applicable programs for the aging effect of cracking as identified in line items IV.C1-1 (R-03) and IV.C1-2 (R-55) for class 1 piping, fittings and branch connections < NPS 4 have been applied to valves < NPS 4.
4. The internal treated water environment for this RCPB component is < 140 Deg F since the component is normally isolated from the RCPB and is located outside of the Primary Containment. Neither line item IV.C1-1 (R-03) for cracking due to SCC/IGSCC or line item IV.C1-2 (R-55) for cracking due to thermal and mechanical loading apply to this component.
5. The accumulator bladder performs an active function and is short-lived (replaceable), therefore, the evaluation of aging effects is not required for the bladder. Bladder degradation is assumed for evaluating the aging effects of the accumulator vessel.
6. Under normal conditions, only the Liquid Poison Tank and the Liquid Poison Pump suction line, including branches to the first stop valve, contain a sodium pentaborate internal environment.

7. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program does not apply to valves.

Table 3.3.2.1.39
Traveling In-Core Probe System
Summary of Aging Management Evaluation

Table 3.3.2.1.39 Traveling In-Core Probe System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Stainless Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
Piping and fittings	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Valve Body	Pressure Boundary	Stainless Steel	Dry Gas (Internal)	None	None	VII.J-21 (AP-22)	3.3.1-79	A
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Table 3.3.2.1.40
Turbine Building Closed Cooling Water System
Summary of Aging Management Evaluation

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Coolers (Condensate Pump Motor)	Leakage Boundary	Copper Alloy	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 3
					Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	A, 3
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 3, 4
Coolers (Condenser Vacuum Pump)	Leakage Boundary	Copper Alloy - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	D
					Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	C
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	C

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Control Room AC)	Leakage Boundary	Carbon Steel - Shell Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Feedwater and Main Steam Sample)	Leakage Boundary	Copper	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B, 3
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A, 3
Coolers (Feedwater Pump Lube Oil)	Leakage Boundary	Copper Alloy - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	D
					Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	C
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	C
Coolers (Final Feedwater Facility)	Leakage Boundary	Stainless Steel - Shell Side Components	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.E4-2 (A-67)	3.3.1-41	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Hydrogen)	Leakage Boundary	Cast Iron - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VIII.E-6 (S-23)	3.4.1-24	B
					Selective Leaching of Materials (B.1.25)	VII.C2-7 (A-50)	3.3.1-43	C, 6
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Reactor Recirculation Pump M-G Sets)	Leakage Boundary	Copper Alloy - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	D
					Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	C
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	C
Coolers (Service Air Compressor Aftercooler)	Leakage Boundary	Carbon Steel - Shell Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Service Air Compressor Cylinders)	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	D, 5

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Coolers (Service Air Compressor Cylinders)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Service Air Compressor InterCooler)	Leakage Boundary	Carbon Steel - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VIII.E-6 (S-23)	3.4.1-24	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Stator Winding Liquid)	Leakage Boundary	Carbon Steel - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VIII.E-6 (S-23)	3.4.1-24	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Thermal Control Unit)	Leakage Boundary	Carbon Steel - Shell Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Coolers (Turbine Lube Oil)	Leakage Boundary	Carbon Steel - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VIII.E-6 (S-23)	3.4.1-24	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Filter Housing	Leakage Boundary	Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter Housing	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Flexible Connection	Leakage Boundary	Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Flow Element	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Flow Glass	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Glass	Closed Cooling Water (Internal)	None	None			G, 1
			Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A
Gauge Snubber	Leakage Boundary	Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Gauge Snubber	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Heat Exchangers (Generator Bus)	Leakage Boundary	Copper - Tube Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	D
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	C
Heat Exchangers (TBCCW)	Leakage Boundary	Carbon and low alloy steel - Shell Side Components	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-1 (A-63)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Level Glass	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Glass	Closed Cooling Water (Internal)	None	None			G, 1
			Indoor Air (External)	None	None	VII.J-10 (AP-14)	3.3.1-75	A

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
					One-Time Inspection (B.1.24)	VII.C2-14 (A-25)	3.3.1-42	E, 2
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Galvanized Steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)			G
					One-Time Inspection (B.1.24)			G, 2
			Indoor Air (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	A
		Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
					One-Time Inspection (B.1.24)	VII.C2-9 (A-52)	3.3.1-39	E, 2
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing (TBCCW Pumps, Chemical Feed Pump)	Leakage Boundary	Cast Iron	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-7 (A-50)	3.3.1-43	B
					Selective Leaching of Materials (B.1.25)	VII.C2-7 (A-50)	3.3.1-43	A
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Tanks (Surge, Chemical Mixing, Closed Cooling Water)	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
Thermowell	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B

Table 3.3.2.1.40 Turbine Building Closed Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
Valve Body	Leakage Boundary	Carbon and low alloy steel	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-14 (A-25)	3.3.1-42	B
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
		Copper Alloy	Closed Cooling Water (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-3 (AP-12)	3.3.1-38	B
					Selective Leaching of Materials (B.1.25)	VII.A4-8 (AP-43)	3.3.1-65	A
			Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
		Stainless Steel	Closed Cooling Water < 140F (Internal)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VII.C2-9 (A-52)	3.3.1-39	B
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects identified for this material/environment combination are consistent with industry standards.
2. The One-Time Inspection program confirms the absence of aging effects in stagnant flow areas.
3. Coolers that consist only of coiled tubing or rows of tubing are included in the component category of piping, piping components, and piping elements.
4. Only the failure of the portion of the cooler external to the motor housing will result in external leakage (spatial interaction).
5. The cooling water channel is integral to the compressor housing. For the Leakage Boundary intended function, only the indoor air external environment is considered.
6. The aging mechanisms of general, pitting, and crevice corrosion are managed by line item VIII.E-6 (S-23).

Table 3.3.2.1.41
Water Treatment & Distr. System
Summary of Aging Management Evaluation

Table 3.3.2.1.41 Water Treatment & Distr. System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VII.I-4 (AP-27)	3.3.1-35	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VII.I-5 (AP-26)	3.3.1-35	B
Filter Housing (including Purifier M-12-1)	Leakage Boundary	Polymers (plastic)	Indoor Air (External)	None	None			F
			Treated Water (Internal)	None	None			F, 2
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Flexible Hose	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A

Table 3.3.2.1.41 Water Treatment & Distr. System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flexible Hose	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Flow Element	Leakage Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-4 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-4 (AP-38)	3.3.1-15	B
Flow Meter	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Selective Leaching of Materials (B.1.25)	VII.E4-11 (AP-31)	3.3.1-67	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
Piping and fittings	Leakage Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A

Table 3.3.2.1.41 Water Treatment & Distr. System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Aluminum	Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)			G
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-4 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-4 (AP-38)	3.3.1-15	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B

Table 3.3.2.1.41 Water Treatment & Distr. System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Indoor Air (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.F3-6 (A-11)	3.3.1-16	E
Restricting Orifice	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A

Table 3.3.2.1.41 Water Treatment & Distr. System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Restricting Orifice	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
Tanks (including Hot Water Heater H-12-1)	Leakage Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-4 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-4 (AP-38)	3.3.1-15	B
Valve Body	Leakage Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-4 (AP-38)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-4 (AP-38)	3.3.1-15	B
		Brass	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A
			Treated Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.E4-10 (AP-32)	3.3.1-65	A
		Bronze	Indoor Air (External)	None	None	V.F-4 (EP-10)	3.2.1-35	A

Table 3.3.2.1.41 Water Treatment & Distr. System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Bronze	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VII.E4-10 (AP-32)	3.3.1-65	A
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Selective Leaching of Materials (B.1.25)	VII.E4-11 (AP-31)	3.3.1-67	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-15 (A-58)	3.3.1-22	A
					Water Chemistry (B.1.2)	VII.E4-15 (A-58)	3.3.1-22	B
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 1
			Containment Atmosphere (Internal)	None	None	VII.D-3 (A-80)	3.3.1-12	I, 1

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
2. Based on industry operating experience aging of thermoplastics in treated water environments is not an applicable aging effect. (Mechancial Tools, Treated Water - Appendix A)

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEM

3.4.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.3.4, Steam and Power Conversion System, as being subject to aging management review. The systems, or portions of systems, which are addressed in this section are described in the indicated sections.

- Condensate System (2.3.4.1)
- Condensate Transfer System (2.3.4.2)
- Feedwater System (2.3.4.3)
- Main Condenser (2.3.4.4)
- Main Generator and Auxiliary System (2.3.4.5)
- Main Steam System (2.3.4.6)
- Main Turbine and Auxiliary System (2.3.4.7)

3.4.2 RESULTS

3.4.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Managements Programs For The Steam and Power Conversion System

3.4.2.1.1 Condensate System

Materials

The materials of construction for the Condensate System components are:

- Carbon and Low Alloy Steel
- Cast Iron
- Elastomer
- Glass
- Stainless Steel

Environments

The Condensate System components are exposed to the following environments:

- Indoor Air
- Treated Water
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Condensate System components require management:

- Change in Material Properties

- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Condensate System components:

- Bolting Integrity
- Flow Accelerated Corrosion
- One Time Inspection
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.4.2.1.1, Summary of Aging Management Evaluation – Condensate System the results of the aging management review for the Condensate System.

3.4.2.1.2 Condensate Transfer System

Materials

The materials of construction for the Condensate Transfer System components are:

- Alloy Steel
- Aluminum
- Aluminum Bronze
- Carbon and Low Alloy Steel
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The Condensate Transfer System components are exposed to the following environments:

- Soil
- Indoor Air
- Outdoor Air
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Condensate Transfer System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Condensate Transfer System components:

- Aboveground Outdoor Tanks
- Bolting Integrity
- Buried Piping Inspection
- One-Time Inspection
- Periodic Inspection Program
- Selective Leaching of Materials
- Structures Monitoring Program
- Water Chemistry

Table 3.4.2.1.2, Summary of Aging Management Evaluation – Condensate Transfer System summarizes the results of the aging management review for the Condensate Transfer System.

3.4.2.1.3 Feedwater System

Materials

The materials of construction for the Feedwater System components are:

- Carbon and low alloy steel
- Chrome Moly steels
- Stainless Steel

Environments

The Feedwater System components are exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Lubricating Oil
- Treated Water
- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Feedwater System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss Of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Feedwater System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

- Bolting Integrity
- Flow-Accelerated Corrosion
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.4.2.1.3, Summary of Aging Management Evaluation – Feedwater System summarizes the results of the aging management review for the Feedwater System

3.4.2.1.4 Main Condenser

Materials

The materials of construction for the Main Condenser components are:

- Aluminum Bronze
- Carbon and low alloy steel
- Titanium

Environments

The Main Condenser components are exposed to the following environments:

- Indoor Air
- Raw Water – Salt Water
- Steam

Aging Effects Requiring Management

The following aging effects associated with the Main Condenser require management

- None

Aging Management Programs

The following aging management programs manage the aging effects for the Main Condenser components:

- None

Table 3.4.2.1.4, Summary of Aging Management Evaluation – Main Condenser summarizes the results of the aging management review for the Main Condenser.

3.4.2.1.5 Main Generator and Auxiliary System

Materials

The materials of construction for the Main Generator and Auxiliary System components are:

- Carbon and low alloy steel
- Glass

- Stainless Steel

Environments

The Main Generator and Auxiliary System components are exposed to the following environments:

- Indoor Air
- Lubricating Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Main Generator and Auxiliary System require Management

- Loss of Material
- Loss Of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Main Generator and Auxiliary System components:

- Bolting Integrity
- Generator Stator Water Chemistry Activities
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Structures Monitoring Program

Table 3.4.2.1.5, Summary of Aging Management Evaluation – Main Generator and Auxiliary System summarizes the results of the aging management review for the Main Generator and Auxiliary System.

3.4.2.1.6 Main Steam System

Materials

The materials of construction for the Main Steam System components are:

- Alloy Steel
- Carbon and low alloy steel
- CASS
- Chrome Moly steels
- Stainless Steel

Environments

The Main Steam System components are exposed to the following environments:

- Closed Cooling Water
- Containment Atmosphere
- Indoor Air
- Steam
- Treated Water

- Treated Water <140F

Aging Effects Requiring Management

The following aging effects associated with the Main Steam System components require management:

- Cracking Initiation and Growth
- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss Of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Main Steam System components:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
- Bolting Integrity
- Closed-Cycle Cooling Water System
- Flow-Accelerated Corrosion
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.4.2.1.6, Summary of Aging Management Evaluation – Main Steam System summarizes the results of the aging management review for the Main Steam System.

3.4.2.1.7 Main Turbine and Auxiliary System

Materials

The materials of construction for the Main Turbine and Auxiliary System components are:

- Carbon and low alloy steel
- Glass
- Stainless Steel

Environments

The Main Turbine and Auxiliary System components are exposed to the following environments:

- Indoor Air
- Lubricating Oil
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Main Turbine and Auxiliary System components require management:

- Cracking Initiation and Growth

- Loss of Material
- Loss Of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Main Turbine and Auxiliary System components:

- Bolting Integrity
- Flow-Accelerated Corrosion
- Lubricating Oil Monitoring Activities
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.4.2.1.7, Summary of Aging Management Evaluation – Main Turbine and Auxiliary System summarizes the results of the aging management review for the Main Turbine and Auxiliary System.

3.4.2.2 AMR Results Consistent with the GALL Report for Which Further Evaluation is Recommended

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the license renewal application. For the Steam and Power Conversion Systems, those programs are addressed in the following subsections.

3.4.2.2.1 Cumulative Fatigue Damage

Fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of metal fatigue as a TLAA for the non-Class 1 portions of the Feedwater System and Main Steam System is discussed in Section 4.3.3.

3.4.2.2.2 Loss of Material due to General, Pitting, and Crevice Corrosion

1. Loss of material due to general, pitting and crevice corrosion can occur for steel and aluminum piping, piping components, and piping elements exposed to treated water, for steel heat exchanger shell side components exposed to treated water, and for steel piping, piping components, and piping elements exposed to steam. The existing aging management program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29 (EPRI TR-103515) for water chemistry in BWRs and EPRI guidelines of TR-102134 for secondary water chemistry in PWRs to manage the effects of loss of material due to general, pitting, or crevice corrosion. However, control of water chemistry does not preclude loss of material due to general, pitting, and crevice corrosion at locations of stagnant flow conditions Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring. The GALL report recommends further evaluation to verify the effectiveness of the water chemistry control program. A one-time

inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in steel and aluminum piping, piping components, and piping elements exposed to a treated water environment, steel heat exchanger components exposed to a steam or treated water environment, and steel piping, piping components, and piping elements exposed to a steam environment in the Condensate System, Condensate Transfer System, Feedwater System, Main Steam System, Main Turbine and Auxiliary System, Emergency Service Water System, Reactor Building Closed Cooling Water System, and Heating and Process Steam System. The One-Time Inspection program also will be used to verify the effectiveness of the Water Chemistry program to manage the loss of material in steel shell and shell side components exposed to a treated water environment in the Isolation Condenser System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

2. Loss of material due to general, pitting, and crevice corrosion can occur for steel piping, piping components, and piping elements exposed to lubricating oil or steam. The GALL report recommends further evaluation to ensure that this aging effect is adequately managed.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in steel piping, piping components, and piping elements exposed to lubricating oil internal environment in the Feedwater System, Main Turbine and Auxiliary System and Main Generator and Auxiliary System. The Lubricating Oil Monitoring Activities program manages physical and chemical properties of lubricating oil by sampling, testing, and trending to identify specific wear mechanisms, contamination, and oil degradation that could affect intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Lubricating Oil Monitoring Activities and One-Time Inspection programs are described in Appendix B.

3.4.2.2.3 Loss of Material due to General, Pitting, Crevice and Microbiologically Influenced Corrosion, and Fouling

Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion (MIC), and fouling could occur in steel piping, piping components, and piping elements exposed to untreated water. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

This is applicable to PWRs only.

3.4.2.2.4 Loss of Material due to General Corrosion

Loss of material due to general corrosion could occur on the external surfaces of all steel structures and components, including closure bolting. The GALL report recommends further evaluation to ensure that this aging effect is adequately managed.

Oyster Creek will implement a Structures Monitoring Program, B.1.31, to inspect the external surfaces of steel piping, piping components, piping elements, and heat exchangers in an indoor air external or outdoor air external environment in the Condensate System, Condensate Transfer System, Feedwater System, Main Steam System, Main Turbine and Auxiliary System, Main Generator and Auxiliary System, and Heating and Process Steam System. The Structures Monitoring Program relies on periodic visual inspections by qualified individuals to identify and evaluate the degradation of piping, piping components, piping elements, and heat exchangers to ensure that there is no loss of intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

At Oyster Creek, the aging effect of loss of material due to general corrosion in the Primary Containment atmosphere is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. Therefore, there is no loss of material for carbon steel components exposed to a containment nitrogen environment because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. This conclusion is supported by past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1).

3.4.2.2.5 Loss of Material Due to General Pitting, Crevice, and Microbiologically Influenced Corrosion

1. Loss of material due to general, pitting, crevice and microbiologically influenced corrosion could occur in steel piping, piping, components, piping elements exposed to raw water and in steel heat exchanger shell side components exposed to lubricating oil. The GALL report recommends further evaluation to ensure that these aging effects are adequately managed.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to manage the loss of material in steel piping, piping components, piping elements, and heat exchangers exposed to a raw water - fresh water environment in the Drywell Floor and Equipment Drains System, Miscellaneous Floor and Equipment Drain System, Reactor Building Floor and Equipment Drains System, and in the Roof Drains and Overboard Discharge System. The One-Time Inspection program will confirm that loss of material is insignificant in piping and piping system components that contain raw water – fresh water, but are not normally pressurized. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The One-Time Inspection program is described in Appendix B.

2. Loss of material due to general corrosion, pitting and crevice corrosion, and MIC could occur in steel (with or without wrapping) piping, piping components, piping elements and tanks in soil. The buried piping and tanks inspection program relies on industry practice, frequency of pipe excavation, and operating experience to manage the effects of loss of material from general corrosion, pitting and crevice corrosion, and MIC. The effectiveness of the buried piping and tanks inspection program should be verified to evaluate an applicant's inspection frequency and operating experience with buried components, ensuring that loss of material is not occurring.

   Oyster Creek will implement a Buried Pipe Inspection program, B.1.26, to manage the loss of material in steel piping exposed to soil in the Heating and Process Steam System. The Buried Piping Inspection program includes preventive measures to mitigate corrosion and periodic inspection to manage the effects of corrosion on the pressure-retaining capacity of buried steel piping, piping components, and piping elements. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Buried Piping Inspection program is described in Appendix B.

3.4.2.2.6 <u>Cracking due to Stress Corrosion Cracking</u>

1. Cracking due to SCC could occur in the stainless steel piping, piping components, piping elements, and heat exchanger tube-side components (including the tubes) exposed to treated water >60°C (>140°F) or steam. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29, BWR Water Chemistry Guidelines TR-103515 and TR-102134, PWR Secondary Water Chemistry Guideline to manage the effects of cracking due to SCC. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause SCC. Therefore, the GALL report recommends that the effectiveness of the chemistry control program should be verified to ensure that SCC is not occurring. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that stress corrosion cracking is not

occurring and that the component's intended function will be maintained during the period of extended operation.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage stress corrosion cracking of stainless steel piping, piping components, piping elements, and coolers exposed to treated water > 140°F or exposed to a steam environment in the Feedwater System, Heating & Process Steam System, Main Steam System, Isolation Condenser System, Shutdown Cooling System, and Main Turbine Auxiliary System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

2. Cracking due to SCC could occur in stainless steel tanks exposed to treated water >60°C (>140°F). The closed-cycle cooling water program relies on monitoring and control of water chemistry based on established guidelines to manage the effects of cracking due to SCC. However, high concentrations of impurities at crevices and locations of stagnant flow conditions could cause SCC. Therefore, the GALL report recommends that the effectiveness of the chemistry control program should be verified to ensure that SCC is not occurring. A one-time inspection of selected components at susceptible locations is an acceptable method to ensure that stress corrosion cracking is not occurring and that the component's intended function will be maintained during the period of extended operation.

   This line item is not used at Oyster Creek. Oyster Creek does not have any stainless steel tanks normally exposed to treated water >140°F, in the scope of License Renewal.

3.4.2.2.7 Loss of Material due to Pitting and Crevice Corrosion

1. Loss of material due to pitting and crevice corrosion can occur for stainless steel piping, piping components, and piping elements; tanks, and heat exchanger shell-side components exposed to treated water. The water chemistry program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29 (EPRI TR-103515) for water chemistry in BWRs and EPRI guidelines of TR-102134 for secondary water chemistry in PWRs to manage the effects of loss of material due to pitting, or crevice corrosion. However, these effects may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the chemistry control program should be verified to ensure that corrosion is not occurring.

   The GALL report recommends further evaluation of programs to manage loss of material due to pitting, and crevice corrosion to verify the effectiveness of the water chemistry program. A one-time inspection of select components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the component's intended function will be maintained during the period of extended operation.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in stainless steel, piping components, piping elements, tanks, and heat exchanger shell-side components exposed to a treated water environment in the Condensate System, Feedwater System, Main Steam System, Main Turbine and Auxiliary System, and Reactor Water Cleanup System. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Water Chemistry and One-Time Inspection programs are described in Appendix B.

2. Loss of material due to pitting and crevice corrosion can occur for stainless steel piping, piping components, and piping elements exposed to soil or raw water. The GALL report recommends further evaluation to ensure that this aging effect is adequately managed.

   Oyster Creek will implement a Buried Piping Inspection program, B.1.26, to manage the loss of material in stainless steel piping exposed to soil in the Heating and Process Steam System. The Buried Piping Inspection program includes preventive measures to mitigate corrosion and periodic inspection to manage the effects of corrosion on the pressure-retaining capacity of buried stainless steel piping. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Buried Piping Inspection program is described in Appendix B.

   Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to a raw water - fresh water environment in the Drywell Floor and Equipment Drains System, Miscellaneous Floor and Equipment Drain System, and Reactor Building Floor and Equipment Drains System. The One-Time Inspection program will confirm that loss of material is insignificant in piping and piping system components that contain raw water – fresh water, but are not normally pressurized. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The One-Time Inspection program is described in Appendix B.

3.4.2.2.8 <u>Loss of Material due to Pitting, Crevice, and Microbiologically Influenced Corrosion</u>

Loss of material due to pitting, crevice, and microbiologically influenced corrosion can occur for stainless steel piping, piping components, piping elements, and heat exchanger shell side components exposed to lubricating oil. The GALL report recommends further evaluation to ensure that this aging effect is adequately managed.

Oyster Creek will implement a One-Time Inspection program, B.1.24, for susceptible locations to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to lubricating oil internal environment in the Main Turbine and Auxiliary System. The Lubricating Oil Monitoring Activities program manages physical and chemical properties of lubricating oil by sampling, testing, and trending to identify specific wear mechanisms, contamination, and oil degradation that could affect intended functions. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Lubricating Oil Monitoring Activities and One-Time Inspection programs are described in Appendix B.

3.4.2.2.9 Loss of Material due to Pitting, Crevice, and Galvanic Corrosion

Loss of material due to pitting, crevice, and galvanic corrosion can occur for copper alloy piping, piping components, and piping elements in lubricating oil. The GALL report recommends further evaluation to ensure that this aging effect is adequately managed.

This line item is not used at Oyster Creek. At Oyster Creek, there are no in-scope copper alloy piping, piping components, and piping elements in a lubricating oil environment in the Steam and Power Conversion systems.

3.4.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Steam and Power Conversion System components:

- Section 4.3, Metal Fatigue Analysis

3.4.3 CONCLUSION

The Steam and Power Conversion System piping, fittings, and components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Steam and Power Conversion System components are identified in the summaries in Section 3.4.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Steam and Power Conversion System components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-1	Piping, piping components, and piping elements	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.4.2.2.1.
3.4.1-2	Steel and aluminum piping, piping components, and piping elements exposed to treated water; steel heat exchanger shell side components exposed to treated water, 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 with exceptions. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage the loss of material in steel and aluminum piping, piping components, piping elements, and heat exchangers exposed to a treated water or steam environment. The One-Time Inspection program also will be used to verify the effectiveness of the Water Chemistry Program to manage the loss of material in the steel isolation condenser shell and shell side components exposed to a treated water environment. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry program implementation. See subsection 3.4.2.2.2.1.
3.4.1-3	Steel piping, piping components, and piping elements exposed to lubricating oil or steam	Loss of material due to general, pitting and crevice corrosion	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in steel piping, piping components, and piping elements exposed to lubricating oil environment. See subsection 3.4.2.2.2.2

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-4	Steel piping, piping components, and piping elements exposed to untreated water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Plant specific	Yes, plant specific	Not applicable. This item applies to the Auxiliary Feedwater System of a PWR, and is not applicable to Oyster Creek. See subsection 3.4.2.2.3.
3.4.1-5	Steel external surfaces exposed to air – indoor uncontrolled (external), condensation (external), or air outdoor (external)	Loss of material due to general corrosion	Plant specific	Yes, plant specific	The Structures Monitoring Program, B.1.31, will be used to inspect the external surfaces of steel piping, piping components, piping elements, and heat exchangers exposed to an indoor air (external) or outdoor air (external) environment. See subsection 3.4.2.2.4.
3.4.1-6	Steel heat exchanger shell side components exposed to lubricating oil; steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to manage the loss of material in steel piping, piping components, piping elements, and heat exchangers exposed to a raw water - fresh water environment. See subsection 3.4.2.2.5.1

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-7	Steel piping, piping components, piping elements, and tanks (with or without coating or wrapping) exposed to soil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	Consistent with NUREG-1801 with exceptions. The Buried Piping Inspection program, B.1.26, will be used to manage the loss of material in steel piping exposed to soil. Exceptions apply to the NUREG-1801 recommendations for Buried Piping Inspection program implementation. See subsection 3.4.2.2.5.2.
3.4.1-8	Stainless steel piping, piping components, piping elements, tanks, and heat exchanger tube side components (including tubes) exposed to treated water >60°C (>140°F); stainless steel piping, piping components, piping elements exposed to steam	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 with exceptions. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage SCC of stainless steel piping, piping components, piping elements, and coolers exposed to treated water > 140°F or exposed to a steam environment. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry program implementation. See subsection 3.4.2.2.6.1.
3.4.1-9	Stainless steel tanks exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-cycle cooling water system and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Not applicable. See subsection 3.4.2.2.6.2.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-10	Stainless steel piping, piping components, and piping elements; tanks, and heat exchanger shell-side 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 with exceptions. The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage loss of material of stainless steel piping, piping components, piping elements, tanks, and heat exchangers exposed to a treated water environment. Exceptions apply to the NUREG-1801 recommendations for Water Chemistry program implementation. See subsection 3.4.2.2.7.1.
3.4.1-11	Stainless steel piping, piping components, and piping elements exposed to soil or raw water	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	The Buried Piping Inspection program, B.1.26, will be used to manage the loss of material in stainless steel piping exposed to soil. The One-Time Inspection program, B.1.24, will be used to manage the loss of material in stainless steel piping, piping components, piping elements, and heat exchangers exposed to a raw water – fresh water environment. See subsection 3.4.2.2.7.2.
3.4.1-12	Stainless steel piping, piping components, piping elements, and heat exchanger shell side components exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Plant specific	Yes, plant specific	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Lubricating Oil Monitoring Activities program, B.2.2, to manage the loss of material in stainless steel piping, piping components, and piping elements exposed to lubricating oil environment. See subsection 3.4.2.2.8.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-13	Copper alloy piping, piping components, and piping elements in lubricating oil	Loss of material due to pitting, crevice, and galvanic corrosion	Plant specific	Yes, plant specific	Not applicable. See subsection 3.4.2.2.9.
3.4.1-14	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Not applicable. There are no in-scope copper alloy components exposed to closed cycle cooling water in the Steam and Power Conversion systems at Oyster Creek.
3.4.1-15	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water or raw water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Not applicable. There are no in-scope copper alloy components exposed to closed cycle cooling water or raw water in the Steam and Power Conversion systems at Oyster Creek, except the Main Condenser tubesheet. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, Section 3.4.2.4.4 and NUREG-1769, Peach Bottom SER, Section 3.4.2.3), the staff concluded that the main condenser integrity is continually verified during normal plant operation and no aging management program is required to assure the post-accident intended function.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-16	Gray cast iron piping, piping components, and piping elements exposed to soil, treated water, or untreated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801. The Selective Leaching of Materials program, B.1.25, will be used to manage the loss of material in cast iron piping components, and piping elements exposed to a treated water or steam environment in the Condensate System, and Heating and Process Steam System.
3.4.1-17	Stainless steel piping, piping components, piping elements, and heat exchanger tube side components exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System program, B.1.14, is used to manage loss of material in stainless steel cooler tube side components exposed to a closed cooling water environment in the Main Steam System. The exceptions apply to the NUREG-1801 recommendations for Closed-Cycle Cooling Water System program implementation.
3.4.1-18	Stainless steel heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Not applicable. There are no in-scope stainless steel heat exchanger tubes exposed to a closed cycle cooling water environment with a heat transfer intended function in the Steam and Power Conversion Systems at Oyster Creek.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-19	Stainless steel heat exchanger tube side components exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no in-scope stainless steel heat exchanger tube side components exposed to a raw water environment at Oyster Creek.
3.4.1-20	Stainless steel piping, piping components, and piping elements exposed to steam	Cracking due to stress corrosion cracking	Water Chemistry	No	Not applicable. This item applies to the Main Steam System of a PWR, and is not applicable to Oyster Creek.
3.4.1-21	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry	No	Not applicable. There are no in-scope stainless steel heat exchanger tubes exposed to a treated water environment with a heat transfer intended function in the Steam and Power Conversion Systems at Oyster Creek.
3.4.1-22	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Open-Cycle Cooling Water System	No	Not applicable. There are no in-scope stainless steel or copper alloy components exposed to raw water in the Steam and Power Conversion systems at Oyster Creek, except the Main Condenser tubesheet. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, Section 3.4.2.4.4 and NUREG-1769, Peach Bottom SER, Section 3.4.2.3), the staff concluded that the main condenser integrity is continually verified during normal plant operation and no aging management program is required to assure the post-accident intended function.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-23	Steel tanks exposed to air – outdoor (external)	Loss of material due to general corrosion	Aboveground steel tanks	No	Consistent with NUREG-1801, with exceptions. The Aboveground Outdoor Tanks program, B.1.21, will be used to manage the loss of material in steel tanks exposed to an outdoor air environment in the Condensate Transfer System. The exceptions apply to the NUREG-1801 recommendations for Aboveground Outdoor Tanks program implementation.
3.4.1-24	Steel heat exchanger tube side components exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with exceptions. The Closed-Cycle Cooling Water System program, B.1.14, will be used to manage loss of material in steel heat exchanger tube side components exposed to a closed cooling water environment in the Turbine Building Closed Cooling Water System. The exceptions apply to the NUREG-1801 recommendations for Closed-Cycle Cooling Water System program implementation.
3.4.1-25	Steel heat exchanger tube side components exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no in-scope steel heat exchanger tube side components exposed to a raw water environment in the Steam and Power Conversion systems at Oyster Creek.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-26	Steel piping, piping components, and piping elements exposed to steam or treated water	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	No	Consistent with NUREG-1801. The Flow-Accelerated Corrosion program, B.1.11, will be used to manage loss of material due to flow-accelerated corrosion in steel piping, piping components, piping elements, and heat exchangers exposed to steam or treated water in the Condensate System, Feedwater System, Main Steam System, and Main Turbine and Auxiliary System.
3.4.1-27	Steel bolting and closure bolting exposed to air with steam or water leakage, air – outdoor (external), or air – indoor uncontrolled (external); high-strength steel closure bolting exposed to air with steam or water leakage	Loss of material due to general, pitting and crevice corrosion; cracking due to cyclic loading, stress corrosion cracking; loss of preload due to stress relaxation	Bolting Integrity	No	Consistent with NUREG-1801, with exceptions. The Bolting Integrity program, B.1.12, will be used to manage the loss of material and loss of preload in steel closure bolting exposed to an indoor or outdoor air environment in Steam and Power Conversion Systems. The exceptions apply to NUREG-1801 recommendations for Bolting Integrity program implementation.
3.4.1-28	Steel and stainless steel heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no in-scope steel or stainless steel heat exchanger tubes exposed to a raw water environment in the Steam and Power Conversion systems at Oyster Creek.

Table 3.4.1 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-29	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	The One-Time Inspection program, B.1.24, will be used to verify the effectiveness of the Water Chemistry program, B.1.2, to manage loss of material in steel and stainless steel piping, piping components, piping elements, and coolers exposed to a steam environment in the Heating & Process Steam System, Main Turbine and Auxiliary System, and Main Steam System.
3.4.1-30	PWR only				
3.4.1-31	Glass piping, piping components, and piping elements exposed to air, lubricating oil, raw water, and treated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-32	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 Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-33	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	Not Applicable. Controlled air environments are not credited at Oyster Creek. Components are evaluated as part of the uncontrolled indoor air environment.
3.4.1-34	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Not applicable. There are no in-scope steel or stainless steel piping, piping components, and piping elements in a concrete environment in the Steam and Power Conversion systems at Oyster Creek.
3.4.1-35	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Not applicable. There are no in-scope steel, stainless steel, aluminum, or copper alloy piping, piping components, and piping elements exposed to a gas environment in the Steam and Power Conversion systems at Oyster Creek.
3.4.1-36	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to lubricating oil (no water pooling)	None	None	NA - No AEM or AMP	Not Applicable. Lubricating oil (no water pooling) is not credited at Oyster Creek. Components are evaluated as part of the lubricating oil environment.

Table 3.4.2.1.1
Condensate System
Summary of Aging Management Evaluation

Table 3.4.2.1.1 Condensate System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VIII.H-5 (S-33)	3.4.1-27	B
Expansion Joint	Leakage Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.F2-7 (A-36)	3.3.1-10	E
			Treated Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)	VII.A4-1 (A-16)	3.3.1-11	E
		Elastomer (Tube)	Treated Water (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)	VII.A4-1 (A-16)	3.3.1-11	E
Filter Housing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B

Table 3.4.2.1.1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
Heat Exchangers	Leakage Boundary	Carbon and low alloy steel - Tube side components	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	D
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.E-29 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A

Table 3.4.2.1.1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-2 (S-21)	3.4.1-10	C
					Water Chemistry (B.1.2)	VIII.E-2 (S-21)	3.4.1-10	D
Pump Casing	Leakage Boundary	Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A

Table 3.4.2.1.1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Leakage Boundary	Cast Iron	Treated Water (Internal)	Loss of Material	Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
Restricting Orifice	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
Sensor Element	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
Sight Glasses	Leakage Boundary	Glass	Indoor Air (External)	None	None	VIII.I-6 (SP-9)	3.4.1-31	A
			Treated Water (Internal)	None	None	VIII.I-9 (SP-35)	3.4.1-31	A

Table 3.4.2.1.1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-2 (S-21)	3.4.1-10	C
					Water Chemistry (B.1.2)	VIII.E-2 (S-21)	3.4.1-10	D
Tanks	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	D
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	C

Table 3.4.2.1.1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-32 (S-13)	3.4.1-10	A
					Water Chemistry (B.1.2)	VIII.E-32 (S-13)	3.4.1-10	A
Thermowell	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
		Cast Iron	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.1 Condensate System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Cast Iron	Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Selective Leaching of Materials (B.1.25)	VIII.E-18 (SP-27)	3.4.1-16	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-2 (S-21)	3.4.1-10	C
					Water Chemistry (B.1.2)	VIII.E-2 (S-21)	3.4.1-10	D

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Table 3.4.2.1.2
Condensate Transfer System
Summary of Aging Management Evaluation

Table 3.4.2.1.2 Condensate Transfer System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VIII.H-5 (S-33)	3.4.1-27	B
		Aluminum	Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)			F, 1
				Loss Of Preload	Bolting Integrity (B.1.12)			F, 1
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VIII.H-5 (S-33)	3.4.1-27	B
			Outdoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-1 (S-32)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)			H, 2

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Stainless Steel	Indoor Air (External)	Loss Of Preload	Bolting Integrity (B.1.12)			G
Expansion Joint	Pressure Boundary	Elastomer	Indoor Air (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.F1-8 (A-36)	3.3.1-10	E
			Treated Water <140F (Internal)	Change in Material Properties	Periodic Inspection Program (B.2.5)	VII.A4-1 (A-16)	3.3.1-11	E
Filter	Filter	Aluminum	Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			G
Filter Housing	Pressure Boundary	Aluminum	Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			G
			Outdoor Air (Internal)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			G
Flow Element	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Piping and fittings	Leakage Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-11 (SP-24)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-11 (SP-24)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Soil (External)	Loss of Material	Buried Piping Inspection (B.1.26)			G
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-11 (SP-24)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-11 (SP-24)	3.4.1-2	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Outside Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Pump Casing	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Restricting Orifice	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Restricting Orifice	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Throttle	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
Tanks	Pressure Boundary	Aluminum	Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			F
			Outdoor Air (Internal)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			F
			Soil (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			F
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-11 (SP-24)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.E-11 (SP-24)	3.4.1-2	D, 4
		Galvanized Steel	Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VIII.E-35 (S-31)	3.4.1-23	B

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks	Pressure Boundary	Galvanized Steel	Outdoor Air (Internal)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)	VIII.E-35 (S-31)	3.4.1-23	B
		Stainless Steel	Outdoor Air (External)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			F
			Outdoor Air (Internal)	Loss of Material	Aboveground Outdoor Tanks (B.1.21)			F
Valve Body	Leakage Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-11 (SP-24)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-11 (SP-24)	3.4.1-2	B
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E
	Pressure Boundary	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-11 (SP-24)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-11 (SP-24)	3.4.1-2	B
		Aluminum Bronze	Indoor Air (External)	None	None	VIII.I-2 (SP-6)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.C2-5 (AP-64)	3.3.1-38	E, 3
					Selective Leaching of Materials (B.1.25)	VII.C2-6 (AP-32)	3.3.1-65	A
					Water Chemistry (B.1.2)	VII.C2-5 (AP-64)	3.3.1-38	E, 3
		Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.2 Condensate Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-8 (S-41)	3.4.1-5	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.E-27 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.E-27 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Outdoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.B4-6 (TP-6)	3.5.1-33	C
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	V.D2-23 (EP-32)	3.2.1-3	E
					Water Chemistry (B.1.2)	V.D2-23 (EP-32)	3.2.1-3	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The aging effects for aluminum closure bolting in an outdoor environment includes loss of material and preload.
2. The aging effects for carbon steel closure bolting in an outdoor environment also includes loss of preload.
3. Closed-Cycle Cooling Water System program does not apply to treated water systems. The Water Chemistry and One-Time Inspection programs are applied.
4. Aluminum is a reactive metal, but develops a strongly bonded oxide film, which gives it excellent corrosion resistance in most environments. Once damaged, this film reforms immediately. Aluminum can be susceptible to attack by both crevice and pitting corrosion. Maintaining a low impurity environment can minimize crevice and pitting corrosion. BWRVIP-130 "BWR Water Chemistry Guidelines," 2004, Table B-1, sets the limits for the concentration of corrosive impurities such as chlorides and sulfates below the levels known to cause loss of material. The Oyster Creek water chemistry procedures control the level of chlorides and sulfates in accordance with the EPRI Chemistry Guidelines for the storage tanks. Conductivity is also monitored in accordance with EPRI Chemistry Guidelines, which would give an indication of the introduction of impurities into the tanks. Given the excellent corrosion resistance of aluminum compared to carbon and stainless steel, the Oyster Creek Water Chemistry program will adequately manage the aging of the aluminum storage tanks by maintaining low water impurities. In addition, the Oyster Creek Above Ground Outdoor Tanks program (AMP B.1.21) includes periodic internal UT's of the bottom of the aluminum tanks. The internal UT of the tanks will validate the effectiveness of the Water Chemistry aging management program.

Table 3.4.2.1.3
Feedwater System
Summary of Aging Management Evaluation

Table 3.4.2.1.3 Feedwater System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 9
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 9
						VIII.H-5 (S-33)	3.4.1-27	B

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Dissolution Column	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
Expansion Joint	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5
Filter Housing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter Housing	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.D2-5 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.D2-5 (SP-25)	3.4.1-3	E
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5
Flow Element	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E, 6
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5
	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E, 6
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
Heat Exchangers	Leakage Boundary	Carbon and low alloy steel - Tube Side Components	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	D
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.D2-5 (SP-25)	3.4.1-3	E

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-5 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.D2-6 (S-11)	3.4.1-1	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Chrome Moly steels	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.D2-6 (S-11)	3.4.1-1	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-16 (A-62)	3.3.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	D, 2
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.D2-6 (S-11)	3.4.1-1	A
						IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	IV.C1-7 (R-23)	3.1.1-38	A
						VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 7
		Chrome Moly steels	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 1

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Chrome Moly steels	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B
						IV.C1-2 (R-55)	3.1.1-21	D, 2
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.D2-6 (S-11)	3.4.1-1	A
						IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	IV.C1-7 (R-23)	3.1.1-38	A
						VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Chrome Moly steels	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 7
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B
						IV.C1-2 (R-55)	3.1.1-21	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
						VIII.E-25 (SP-19)	3.4.1-8	A

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
						VIII.E-25 (SP-19)	3.4.1-8	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VII.E3-16 (A-62)	3.3.1-2	A
						IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5
Pump Casing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.D2-5 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.D2-5 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Leakage Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
Strainer Body	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5
Tanks	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E, 8
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.D2-5 (SP-25)	3.4.1-3	E, 8
					One-Time Inspection (B.1.24)	VIII.D2-5 (SP-25)	3.4.1-3	E, 8
Thermowell	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.D2-5 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.D2-5 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 1
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 3, 4, 10
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	IV.C1-7 (R-23)	3.1.1-38	A
						VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B

Table 3.4.2.1.3 Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 3, 4, 7
		Stainless Steel	Containment Atmosphere (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	E, 3, 10
						IV.C1-2 (R-55)	3.1.1-21	E, 3, 10
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	E, 3, 10
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 5
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 5

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.
2. The Aging Management Programs recommended in NUREG 1801 for Class 1 carbon and stainless steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 piping, fittings, and branch connections >= 4 in. N.P.S.
3. The applicable Aging Management Programs recommended in NUREG 1801 for Class 1 carbon and stainless steel piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 valve bodies < 4 in. N.P.S.
4. The applicable Aging Management Programs recommended in NUREG 1801 for Class 1 carbon steel and stainless piping, fittings, and branch connections < 4 in. N.P.S. are also specified here for Class 1 valve bodies >= 4 in. N.P.S.
5. NUREG - 1801 line item VIII.D2-4 (SP-16) component, material, environment, aging effect and aging management program are applicable to a

BWR as well as PWR.

6. The feedwater flow elements consist of a stainless steel venturi inserted inside a section of feedwater carbon steel piping. The venturis are located entirely within the feedwater pipe and therefore do not perform a leakage or pressure boundary function. Both the leakage and pressure boundary functions are performed by the pipe. These devices have no throttle function.
7. SCC and IGSCC of carbon and low alloy steel are not considered applicable aging mechanisms in a treated water environment per EPRI Mechanical Tools Appendix A.
8. The lube oil tank functions as the shell side of the feedwater pump lube oil cooler since the cooling coil is inserted directly into the tank. Sample Coolers in the RFP Lube Oil Tank are screened in the TBCCW System.
9. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A193-B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
10. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to valve bodies.
11. Sample Coolers going to the feedwater sink on the outlet of the HP Heaters are screened under TBCCW Coolers.

Table 3.4.2.1.4
Main Condenser
Summary of Aging Management Evaluation

Table 3.4.2.1.4 Main Condenser

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Main Condenser Shell	Containment, Holdup and Plateout	Carbon and low alloy steel	Indoor Air (External)	None	None			J, 1
			Steam (Internal)	None	None			J, 1
Main Condenser Tubes	Containment, Holdup and Plateout	Titanium	Raw Water – Salt Water (Internal)	None	None			J, 1
			Steam (External)	None	None			J, 1
Main Condenser Tubesheet	Containment, Holdup and Plateout	Aluminum Bronze	Raw Water – Salt Water (Internal)	None	None			J, 1
			Steam (Internal)	None	None			J, 1

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Aging management of the main condenser is not based on analysis of materials, environments and aging effects. Condenser integrity required to perform the post accident intended function (holdup and plateout of MSIV leakage) is continuously confirmed by normal plant operation. No traditional aging management review or aging management program is required. The main condenser must perform a significant pressure boundary function (maintain vacuum) to allow continued plant operation. The post-accident intended function of the main condenser is to provide a holdup volume and plateout surface for MSIV leakage. This intended function does not require the condenser to be leak- tight, and the post-accident conditions in the condenser will be essentially atmospheric. Under post- accident conditions, there will be no challenge to the pressure boundary integrity of the condenser. Since normal plant operation assures adequate condenser pressure boundary integrity, the post-accident intended function to provide holdup volume and plateout surface is assured. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, Section 3.4.2.4.4 and NUREG-1769, Peach Bottom SER, Section 3.4.2.3), the staff concluded that the main condenser integrity is continually verified during normal plant operation and no aging management program is required to assure the post-accident intended function.

Table 3.4.2.1.5
Main Generator and Auxiliary System
Summary of Aging Management Evaluation

Table 3.4.2.1.5 Main Generator and Auxiliary System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VIII.H-5 (S-33)	3.4.1-27	B
Filter Housing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Flow Element	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.5 Main Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Leakage Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Gauge Snubber	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
Heat Exchangers	Leakage Boundary	Carbon and low alloy steel - Shell Side Components	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.5 Main Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-7 (AP-57)	3.3.1-23	E
					One-Time Inspection (B.1.24)	VII.K-7 (AP-57)	3.3.1-23	E
Pump Casing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E

Table 3.4.2.1.5 Main Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Leakage Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Restricting Orifice	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Sensor Element (CE)	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Sight Glasses	Leakage Boundary	Glass	Indoor Air (External)	None	None	VIII.I-6 (SP-9)	3.4.1-31	A
			Treated Water (Internal)	None	None	VIII.I-9 (SP-35)	3.4.1-31	A

Table 3.4.2.1.5 Main Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Tanks	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E

Table 3.4.2.1.5 Main Generator and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Loss of Material	Generator Stator Water Chemistry Activities (B.2.3)	VII.K-5 (AP-69)	3.3.1-16	E
					One-Time Inspection (B.1.24)	VII.K-5 (AP-69)	3.3.1-16	E

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Table 3.4.2.1.6
Main Steam System
Summary of Aging Management Evaluation

Table 3.4.2.1.6 Main Steam System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Alloy Steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
						VIII.H-5 (S-33)	3.4.1-27	B

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Containment Atmosphere (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-13 (R-28)	3.1.1-3	A
				Loss of Material	Bolting Integrity (B.1.12)	IV.C1-14 (R-26)	3.1.1-44	B
						VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	V.E-5 (EP-24)	3.2.1-25	B, 4
						VIII.H-5 (S-33)	3.4.1-27	B
Condensing chamber	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Condensing chamber	Pressure Boundary	Carbon and low alloy steel	Steam (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 1, 13
						IV.C1-2 (R-55)	3.1.1-21	B, 1, 13
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A, 1
						IV.C1-2 (R-55)	3.1.1-21	A, 1
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B, 1

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Condensing chamber	Pressure Boundary	Stainless Steel	Steam (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 1
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B, 13
						IV.C1-2 (R-55)	3.1.1-21	B, 13
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Condensing chamber	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 10
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 10
Coolers (Sample)	Pressure Boundary	Stainless Steel (Tube Side Components)	Closed Cooling Water (External)	Loss of Material	Closed-Cycle Cooling Water System (B.1.14)	VIII.E-4 (S-25)	3.4.1-17	B
			Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A, 15
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B, 15
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	E, 2, 15
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B, 15
Eductor	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.B2-5 (S-15)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Eductor	Leakage Boundary	Carbon and low alloy steel	Steam (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
Expansion Joint	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
			Containment Atmosphere (Internal)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
		Stainless Steel	Containment Atmosphere (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B4-4 (C-13)	3.5.1-1	C
				None	None	VIII.I-11 (SP-12)	3.4.1-32	A
Flow Element (Main Steam Line)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
	Throttle	Carbon and low alloy steel	Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element (Main Steam Line)	Throttle	Carbon and low alloy steel	Steam (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
		CASS	Steam	Cracking Initiation and Growth	Water Chemistry (B.1.2)	IV.C1-10 (R-20)	3.1.1-32	E, 9
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B, 8
Gauge Snubber	Pressure Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 10
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 10
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.B2-3 (S-08)	3.4.1-1	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.B2-5 (S-15)	3.4.1-26	A

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
			Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.D2-6 (S-11)	3.4.1-1	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 10
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 10

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
			Containment Atmosphere (Internal)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B, 1
						IV.C1-2 (R-55)	3.1.1-21	D, 1, 3
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 1, 14
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 1
						VIII.B2-3 (S-08)	3.4.1-1	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	IV.C1-7 (R-23)	3.1.1-38	A, 1

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Steam (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.B2-5 (S-15)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 1, 3, 11
			Treated Water (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.D2-6 (S-11)	3.4.1-1	A
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B
					One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	A
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	VIII.D2-6 (S-11)	3.4.1-1	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	IV.C1-7 (R-23)	3.1.1-38	A
						VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 11
		Stainless Steel	Containment Atmosphere (External)	None	None	IV.E-3 (RP-04)	3.1.1-71	A
			Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-1 (R-03)	3.1.1-9	B

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	B
					One-Time Inspection (B.1.24)	IV.C1-1 (R-03)	3.1.1-9	A
						IV.C1-2 (R-55)	3.1.1-21	A
					Water Chemistry (B.1.2)	IV.C1-1 (R-03)	3.1.1-9	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 10
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 10
Sparger (Y-Quencher)	Pressure Boundary	Carbon and low alloy steel	Treated Water (External)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sparger (Y-Quencher)	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
Steam Trap	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
	Pressure Boundary	Chrome Moly steels	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Steam Trap	Pressure Boundary	Chrome Moly steels	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
Thermowell	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
			Containment Atmosphere (Internal)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.B2-5 (S-15)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 10
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 10
	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
			Containment Atmosphere (Internal)	None	None	VIII.H-7 (S-29)	3.4.1-5	I, 5
			Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Cracking Initiation and Growth	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)	IV.C1-2 (R-55)	3.1.1-21	E, 1, 7, 12

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 1, 7, 12
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A, 1
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	IV.C1-7 (R-23)	3.1.1-38	A, 1
						VIII.B2-5 (S-15)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 1, 6, 7, 11
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	IV.C1-2 (R-55)	3.1.1-21	E, 6, 7, 12
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	IV.C1-11 (R-04)	3.1.1-2	A
				Loss of Material	Flow-Accelerated Corrosion (B.1.11)	IV.C1-7 (R-23)	3.1.1-38	A

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.D2-8 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
				Not Applicable	None	IV.C1-1 (R-03)	3.1.1-9	I, 6, 7, 11
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 10
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 10
Valve Body (Bypass Valves)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B

Table 3.4.2.1.6 Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body (Steam Chest)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.B2-5 (S-15)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.B2-4 (S-05)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-4 (S-05)	3.4.1-29	B

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The environment of steam is considered similar to the environment of reactor coolant or treated water for evaluation of this component and material, consistent with the environment definitions in NUREG-1801 Chapter IX.
2. The program for One Time Inspection is credited in addition to the NUREG-1801 recommended program for this item.
3. The Aging Management Programs recommended on NUREG 1801 for Class 1 carbon steel piping, fittings, and branch connections for less than 4" NPS are are also specified here for Class 1 piping, fittings, and branch connections greater than 4" NPS.
4. Line item IV.C1-12 (R-27) for loss of preload for RCPB closure bolting does not apply since the A 193 B7 alloy steel closure bolting is not high-strength. Line item V.E-5 (EP-24) has been applied to the loss of preload aging effect for RCPB closure bolting.
5. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.1.2.4.1), the Staff concluded that the loss of material due to corrosion is not considered a credible aging effect for carbon steel components in a containment nitrogen environment because of negligible amounts of free oxygen (less than 4 percent by volume during normal operation). Both oxygen and moisture must be present for general corrosion to occur because oxygen alone or water free of dissolved oxygen (high humidity in a nitrogen atmosphere) does not corrode carbon steel to any practical extent. The staff found the applicant's identification of no loss of material for the carbon steel components exposed to a containment nitrogen environment acceptable because, with the negligible amounts of free oxygen, anodic reactions do not take place and the corrosion cell does not form. Therefore, no loss of material due to corrosion takes place and the aging effect is none.

6. The applicable Aging Management Programs recommended in NUREG-1801 for Class 1 (CS, SS) piping, fittings, and branch connections that are less than 4 in. N.P.S. are also specified here for Class 1 valve bodies that are less than 4" N.P.S.
7. The applicable Aging Management Programs recommended in NUREG-1801 for Class 1 (CS, SS) piping, fittings, and branch connections that are less than 4 in. N.P.S. are also specified here for Class 1 valve bodies that are greater than 4 N.P.S.
8. CASS material for this item is considered a subset of Stainless Steel for this aging effect.
9. The Main Steam flow element consists of a carbon steel venturi inserted inside a section of carbon steel piping. The carbon steel venturi includes a CASS insert to form the venturi nozzle. The carbon steel venturi and CASS nozzle are located entirely within the pipe and therefore do not perform a Pressure Boundary function. The carbon steel pipe performs the Pressure Boundary function. The venturi and nozzle perform a Throttle intended function. This CASS nozzle is not susceptible to significant stress corrosion cracking (SCC), intergranualar stress corrosion cracking (IGSCC), or thermal embrittlement because the component is under compressive load. The venturi and nozzle are not accessible for direct visual inspection. Since the CASS material in this application is not subject to significant SCC or IGSCC and is inaccessible, the BWR Stress Corrosion Cracking program is not applicable. The Water Chemistry aging management program will adequately manage these aging effects for the CASS material in this application.
10. NUREG-1801 line item VIII.D2-4 (SP-16) component, material, environment, aging effect and aging management program are applicable to a BWR as well as PWR.
11. SCC and IGSCC of carbon and low alloy steels are not considered applicable aging mechanisms in a treated water or steam environment per EPRI Mechanical Tools Appendix A.
12. With the exception of the EMRVs, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD does not apply to valves. When ASME Section XI applies (EMRVs), One-Time Inspection is not required.
13. Condensing chamber is constructed of pipe, therefore, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD has been applied.
14. One-Time Inspection applies only for Class 1 piping, fittings, and branch connections less than 4" NPS.
15. Coolers that consist only of coiled tubing are included in the component category of piping, piping components, and piping elements.

Table 3.4.2.1.7
Main Turbine and Auxiliary System
Summary of Aging Management Evaluation

Table 3.4.2.1.7 Main Turbine and Auxiliary System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
Closure bolting	Mechanical Closure	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Bolting Integrity (B.1.12)	VIII.H-4 (S-34)	3.4.1-27	B
				Loss Of Preload	Bolting Integrity (B.1.12)	VIII.H-5 (S-33)	3.4.1-27	B
Coolers	Leakage Boundary	Carbon and low alloy steel - Shell side Component	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Expansion Joint	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	E, 2
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3
Filter Housing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter Housing	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-2 (SP-38)	3.4.1-12	E
					One-Time Inspection (B.1.24)	VIII.A-2 (SP-38)	3.4.1-12	E
Flexible Hose	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3
Heat Exchangers	Leakage Boundary	Carbon and low alloy steel - Shell side component	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers	Leakage Boundary	Carbon and low alloy steel - Shell side component	Steam (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.A-6 (S-15)	3.4.1-26	C, 1
						VIII.C-3 (S-15)	3.4.1-26	C, 1
					One-Time Inspection (B.1.24)	VIII.A-4 (S-04)	3.4.1-2	C
						VIII.C-1 (S-04)	3.4.1-2	C
					Water Chemistry (B.1.2)	VIII.A-4 (S-04)	3.4.1-2	D
						VIII.C-1 (S-04)	3.4.1-2	D
			Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.E-29 (S-16)	3.4.1-26	C, 1
					One-Time Inspection (B.1.24)	VIII.E-3 (S-18)	3.4.1-2	A

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchangers	Leakage Boundary	Carbon and low alloy steel - Shell side component	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.E-3 (S-18)	3.4.1-2	B
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Steam (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.A-6 (S-15)	3.4.1-26	A
						VIII.C-3 (S-15)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.A-4 (S-04)	3.4.1-2	A
						VIII.C-1 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.A-4 (S-04)	3.4.1-2	B
						VIII.C-1 (S-04)	3.4.1-2	B

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.E-29 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-2 (SP-38)	3.4.1-12	E
					One-Time Inspection (B.1.24)	VIII.A-2 (SP-38)	3.4.1-12	E
			Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	A
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3
Pump Casing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casing	Leakage Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-2 (SP-38)	3.4.1-12	E
					One-Time Inspection (B.1.24)	VIII.A-2 (SP-38)	3.4.1-12	E
Restricting Orifice	Leakage Boundary	Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-2 (SP-38)	3.4.1-12	E
					One-Time Inspection (B.1.24)	VIII.A-2 (SP-38)	3.4.1-12	E
			Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Restricting Orifice	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3
Sight Glasses	Leakage Boundary	Glass	Indoor Air (External)	None	None	VIII.I-6 (SP-9)	3.4.1-31	A
			Lubricating Oil (Internal)	None	None	VIII.I-7 (SP-10)	3.4.1-31	A
Steam Trap	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.A-4 (S-04)	3.4.1-2	A
						VIII.C-1 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.A-4 (S-04)	3.4.1-2	B
						VIII.C-1 (S-04)	3.4.1-2	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.A-4 (S-04)	3.4.1-2	A
						VIII.C-1 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.A-4 (S-04)	3.4.1-2	B
						VIII.C-1 (S-04)	3.4.1-2	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer Body	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3
Tanks	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.C-1 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.C-1 (S-04)	3.4.1-2	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks	Leakage Boundary	Stainless Steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-2 (SP-38)	3.4.1-12	E
					One-Time Inspection (B.1.24)	VIII.A-2 (SP-38)	3.4.1-12	E
Thermowell	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.A-4 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.A-4 (S-04)	3.4.1-2	B
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Leakage Boundary	Stainless Steel	Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	A
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3
Turbine Casing	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E
			Steam (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.A-4 (S-04)	3.4.1-2	C, 2
					Water Chemistry (B.1.2)	VIII.A-4 (S-04)	3.4.1-2	D
Valve Body	Leakage Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VIII.H-7 (S-29)	3.4.1-5	E

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-3 (SP-25)	3.4.1-3	E
					One-Time Inspection (B.1.24)	VIII.A-3 (SP-25)	3.4.1-3	E
			Steam (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.A-6 (S-15)	3.4.1-26	A
						VIII.C-3 (S-15)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.A-4 (S-04)	3.4.1-2	A
						VIII.C-1 (S-04)	3.4.1-2	A
					Water Chemistry (B.1.2)	VIII.A-4 (S-04)	3.4.1-2	B
						VIII.C-1 (S-04)	3.4.1-2	B
			Treated Water (Internal)	Loss of Material	Flow-Accelerated Corrosion (B.1.11)	VIII.E-29 (S-16)	3.4.1-26	A
					One-Time Inspection (B.1.24)	VIII.D2-7 (S-09)	3.4.1-2	A

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon and low alloy steel	Treated Water (Internal)	Loss of Material	Water Chemistry (B.1.2)	VIII.D2-7 (S-09)	3.4.1-2	B
		Stainless Steel	Indoor Air (External)	None	None	VIII.I-11 (SP-12)	3.4.1-32	A
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Monitoring Activities (B.2.2)	VIII.A-2 (SP-38)	3.4.1-12	E
					One-Time Inspection (B.1.24)	VIII.A-2 (SP-38)	3.4.1-12	E
			Steam (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.B2-1 (SP-45)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.B2-1 (SP-45)	3.4.1-8	B
				Loss of Material	One-Time Inspection (B.1.24)	VIII.B2-2 (SP-46)	3.4.1-29	A
					Water Chemistry (B.1.2)	VIII.B2-2 (SP-46)	3.4.1-29	B
			Treated Water (Internal)	Cracking Initiation and Growth	One-Time Inspection (B.1.24)	VIII.E-25 (SP-19)	3.4.1-8	A
					Water Chemistry (B.1.2)	VIII.E-25 (SP-19)	3.4.1-8	B

Table 3.4.2.1.7 Main Turbine and Auxiliary System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Treated Water (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VIII.D2-4 (SP-16)	3.4.1-10	A, 3
					Water Chemistry (B.1.2)	VIII.D2-4 (SP-16)	3.4.1-10	B, 3

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Feedwater heater and drain cooler shells exposed to steam and treated water are susceptible to wall thinning just as piping components in the same system.
2. In addition to Water Chemistry program, a One Time Inspection program will be used to confirm that pitting and crevice corrosion is not occurring.
3. NUREG-1801 line item VIII.D2-4 (SP-16) component, material, environment, aging effect and aging management program are applicable to a BWR as well as PWR.

3.5 AGING MANAGEMENT OF CONTAINMENT, STRUCTURES, COMPONENT SUPPORTS, AND PIPING AND COMPONENT INSULATION

3.5.1 INTRODUCTION

This section provides the results of the aging management review for those components identified in Section 2.4, Primary Containment, Structures, Component Supports, and Piping and Component Insulation as being subject to aging management review. The structures or portions of structures and commodities, which are addressed in this section, are described in the indicated sections.

- Primary Containment (2.4.1)
- Reactor Building (2.4.2)
- Chlorination Facility (2.4.3)
- Condensate Transfer Building (2.4.4)
- Dilution Structure (2.4.5)
- Emergency Diesel Generator Building (2.4.6)
- Exhaust Tunnel (2.4.7)
- Fire Pond Dam (2.4.8)
- Fire Pumphouses (2.4.9)
- Heating Boiler House (2.4.10)
- Intake Structure and Canal (2.4.11)
- Miscellaneous Yard Structures (2.4.12)
- New Radwaste Building (2.4.13)
- Office Building (2.4.14)
- Oyster Creek Substation (2.4.15)
- Turbine Building (2.4.16)
- Ventilation Stack (2.4.17)
- Component Supports Commodity Group (2.4.18)
- Piping and Component Insulation Commodity Group (Section 2.4.19)

3.5.2 RESULTS

3.5.2.1 Materials, Environments, Aging Effects Requiring Management And Aging Management Programs For Primary Containment, Structures, Component Supports, and Piping and Component Insulation

The materials from which specific component/commodities are fabricated, the environments to which they are exposed, the potential aging effects requiring management and the aging programs used to manage these aging effects are provided for each of the above structures in the following sections.

3.5.2.1.1 Primary Containment

Materials

The materials of construction for the Primary Containment are:

- Bronze
- Carbon and low alloy steel
- Concrete
- Dissimilar Metal Welds
- Elastomer
- Galvanized Steel
- Stainless Steel
- Permali

Environments

The Primary containment is exposed to the following environments:

- Concrete
- Containment Atmosphere
- Encased
- Indoor Air
- Raw Water – Fresh Water
- Treated Water < 140^{O}F

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment require management:

- Change in Material Properties
- Cracking
- Cumulative Fatigue Damage (TLAA)
- Fretting or Lockup
- Loss of Leak Tightness
- Loss of Material
- Loss of Preload
- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Primary Containment:

- ASME Section XI, Subsection IWE
- 10 CFR Part 50, Appendix J
- One Time Inspection
- Protective Coating Monitoring and Maintenance Program
- Structures Monitoring Program
- Water Chemistry

Table 3.5.2.1.1, Summary of Aging Management Evaluation – Primary Containment summarizes the results of the aging management review for the Primary Containment.

3.5.2.1.2 Reactor Building

Materials

The materials of construction for the Reactor Building are:
- Aluminum
- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel
- Grout
- Masonry
- Roofing Material
- Stainless Steel

Environments

The Reactor Building is exposed to the following environments:
- Concrete
- Indoor Air
- Outdoor Air
- Raw Water – Fresh Water
- Soil
- Treated Water < 140^{O}F

Aging Effects Requiring Management

The following aging effects associated with the Reactor Building require management:
- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Reactor Building:
- Masonry Wall Program
- One-Time Inspection
- Structures Monitoring Program
- Water Chemistry

Table 3.5.2.1.2, Summary of Aging Management Evaluation – Reactor Building summarizes the results of the aging management review for the Reactor Building

3.5.2.1.3 Chlorination Facility

Materials

The materials of construction for the Chlorination Facility are:
- Aluminum
- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel
- Stainless Steel

Environments

The Chlorination Facility is exposed to the following environments:
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Chlorination Facility require management:
- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management program manages the aging effects for the Chlorination Facility:
- Structures Monitoring Program

Table 3.5.2.1.3, Summary of Aging Management Evaluation – Chlorination Facility summarizes the results of the aging management review for the Chlorination Facility.

3.5.2.1.4 Condensate Transfer Building

Materials

The materials of construction for the Condensate Transfer Building are:
- Aluminum
- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel

Environments

The Condensate Transfer Building is exposed to the following environments:
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Condensate Transfer Building require management:
- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management program manages the aging effects for the Condensate Transfer Building:
- Structures Monitoring Program

Table 3.5.2.1.4, Summary of Aging Management Evaluation – Condensate Transfer Building summarizes the results of the aging management review for the Condensate Transfer Building.

3.5.2.1.5 Dilution Structure

Materials

The materials of construction for the Dilution Structure are:
- Concrete

Environments

The Dilution Structure is exposed to the following environments:
- Aggressive Environment
- Outdoor Air
- Soil
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Dilution Structure require management:
- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management program manages the aging effects for the Dilution Structure:

- RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants

Table 3.5.2.1.5, Summary of Aging Management Evaluation – Dilution Structure summarizes the results of the aging management review for the Dilution Structure.

3.5.2.1.6 Emergency Diesel Generator Building

Materials

The materials of construction for the Emergency Diesel Generator Building are:

- Alloy steel
- Carbon and low alloy steel
- Concrete
- Galvanized Steel

Environments

The Emergency Diesel Generator Building is exposed to the following environments:

- Concrete
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Emergency Diesel Generator Building require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management program manages the aging effects for the Emergency Diesel Generator Building:

- Structures Monitoring Program

Table 3.5.2.1.6, Summary of Aging Management Evaluation – Emergency Diesel Generator Building summarizes the results of the aging management review for the Emergency Diesel Generator Building.

3.5.2.1.7 Exhaust Tunnel

Materials

The materials of construction for the Exhaust Tunnel are:
- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel
- Grout
- Masonry
- Tar

Environments

The Exhaust Tunnel is exposed to the following environments:
- Concrete
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Exhaust Tunnel require management:
- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Sealing

Aging Management Programs

The following aging management programs manage the aging effects for the Exhaust Tunnel:
- Masonry Wall Program
- Structures Monitoring Program

Table 3.5.2.1.7, Summary of Aging Management Evaluation – Exhaust Tunnel summarizes the results of the aging management review for the Exhaust Tunnel.

3.5.2.1.8 Fire Pond Dam

Materials

The materials of construction for the Fire Pond Dam are:
- Various (Concrete, wood, soil, rock, grout, galvanized)

Environments

The Fire Pond Dam is exposed to the following environments:

- Water - Flowing
- Water - Standing

Aging Effects Requiring Management

The following aging effects associated with the Fire Pond Dam require management:

- Loss of Material
- Loss of Form

Aging Management Programs

The following aging management program manages the aging effects for the Fire Pond Dam:

- RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants

Table 3.5.2.1.8, Summary of Aging Management Evaluation – Fire Pond Dam summarizes the results of the aging management review for the Fire Pond Dam.

3.5.2.1.9 Fire Pumphouses

Materials

The materials of construction for the Fire Pumphouses are:

- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel

Environments

The Fire Pumphouses are exposed to the following environments:

- Aggressive Environment
- Indoor Air
- Outdoor Air
- Soil
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Fire Pumphouses require management

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management program manages the aging effects for the Fire Pumphouses:

- Structures Monitoring Program

Table 3.5.2.1.9, Summary of Aging Management Evaluation – Fire Pumphouses summarizes the results of the aging management review for the Fire Pumphouses.

3.5.2.1.10 Heating Boiler House

Materials

The materials of construction for the Heating Boiler House are:

- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel

Environments

The Heating Boiler House is exposed to the following environments:

- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Heating Boiler House require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management program manages the aging effects for the Heating Boiler House:

- Structures Monitoring Program

Table 3.5.2.1.10, Summary of Aging Management Evaluation – Heating Boiler House summarizes the results of the aging management review for the Heating Boiler House.

3.5.2.1.11 Intake Structure and Canal

Materials

The materials of construction for the Intake Structure and Canal are:

- Concrete
- Galvanized Steel
- Various (gravel, tar, soil, wood, galvanized steel)

Environments

The Intake Structure and Canal is exposed to the following environments:

- Aggressive Environment
- Outdoor Air
- Soil
- Water - Flowing
- Water - Standing

Aging Effects Requiring Management

The following aging effects associated with the Intake Structure and Canal require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Form

Aging Management Programs

The following aging management programs manage the aging effects for the Intake Structure and Canal:

- RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants
- Structures Monitoring Program

Table 3.5.2.1.11, Summary of Aging Management Evaluation – Intake Structure and Canal summarizes the results of the aging management review for the Intake Structure and Canal.

3.5.2.1.12 Miscellaneous Yard Structures

Materials

The materials of construction for Miscellaneous Yard Structures are:

- Carbon and low alloy steel
- Concrete
- Galvanized Steel
- Gravel, Sand
- Polyvinyl Chloride (PVC)

Environments

The Miscellaneous Yard Structures are exposed to the following environments:

- Aggressive Environment
- Concrete

- Outdoor Air
- Soil
- Water - Flowing

Aging Effects Requiring Management

The following aging effects associated with the Miscellaneous Yard Structures require management:

- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management program manages the aging effects for Miscellaneous Yard Structures:

- Structures Monitoring Program

Table 3.5.2.1.12, Summary of Aging Management Evaluation – Miscellaneous Yard Structures summarizes the results of the aging management review for Miscellaneous Yard Structures.

3.5.2.1.13 New Radwaste Building

Materials

The materials of construction for the New Radwaste Building are:

- Concrete
- Elastomer

Environments

The New Radwaste Building is exposed to the following environments:

- Indoor
- Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the New Radwaste Building require Management:

- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the New Radwaste Building:

- Structures Monitoring Program

Table 3.5.2.1.13, Summary of Aging Management Evaluation – New Radwaste Building summarizes the results of the aging management review for the New Radwaste Building.

3.5.2.1.14 Office Building

Materials

The materials of construction for the Office Building are:
- Carbon and low alloy steel
- Concrete
- Galvanized Steel
- Masonry

Environments

The Office Building is exposed to the following environments:
- Concrete
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Office Building require management:
- Change in Material Properties
- Cracking
- Loss of Material

Aging Management Programs

The following aging management programs manage the aging effects for the Office Building:
- Masonry Wall Program
- Structures Monitoring Program

Table 3.5.2.1.14, Summary of Aging Management Evaluation – Office Building summarizes the results of the aging management review for the Office Building.

3.5.2.1.15 Oyster Creek Substation

Materials

The materials of construction for the Oyster Creek Substation are:
- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel

Environments

The Oyster Creek Substation is exposed to the following environments:

- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Oyster Creek Substation require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Oyster Creek Substation:

- Structures Monitoring Program

Table 3.5.2.1.15, Summary of Aging Management Evaluation – Oyster Creek Substation summarizes the results of the aging management review for the Oyster Creek Substation.

3.5.2.1.16 Turbine Building

Materials

The materials of construction for the Turbine Building are:

- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel
- Masonry
- Roofing Material

Environments

The Turbine Building is exposed to the following environments:

- Concrete
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Turbine Building require management:

- Change in Material Properties

- Cracking
- Loss of material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Turbine Building:

- Structures Monitoring Program
- Masonry Wall Program

Table 3.5.2.1.16, Summary of Aging Management Evaluation – Turbine Building summarizes the results of the aging management review for the Turbine Building.

3.5.2.1.17 Ventilation Stack

Materials

The materials of construction for the Ventilation Stack are:

- Aluminum
- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel
- Grout

Environments

The Ventilation Stack is exposed to the following environments:

- Concrete
- Indoor Air
- Outdoor Air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Ventilation Stack require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload

Aging Management Programs

The following aging management programs manage the aging effects for the Ventilation Stack:

- Structures Monitoring Program

Table 3.5.2.1.17, Summary of Aging Management Evaluation – Ventilation Stack summarizes the results of the aging management review for the Ventilation Stack.

3.5.2.1.18 Component Supports Commodity Group

Materials

The materials of construction for the Component Supports Commodity Group are:

- Carbon and low alloy steel
- Concrete
- Elastomer
- Galvanized Steel
- Grout
- Lubrite
- Stainless Steel

Environments

The Component supports commodity Group is exposed to the following environments:

- Containment Atmosphere
- Indoor Air
- Outdoor Air
- Treated Water < 140^{O}F

Aging Effects Requiring Management

The following aging effects associated with the Component Supports Commodity Group require management:

- Cumulative Fatigue Damage (TLAA)
- Loss of Material
- Loss of Mechanical Function
- Reduction in Anchor Capacity Due to Local Concrete Degradation
- Reduction or Loss of Isolation Function

Aging Management Programs

The following aging management programs manage the aging effects for the Component Supports Commodity Group:

- ASME Section XI, Subsection IWF
- Structures Monitoring Program
- Water Chemistry

Table 3.5.2.1.18, Summary of Aging Management Evaluation – Component Supports Commodity Group summarizes the results of the aging management review for the Component supports commodity Group.

3.5.2.1.19 Piping and Component Insulation Commodity Group

Materials

The materials of construction for the Piping and Component Insulation Commodity Group are:

- Aluminum
- Asbestos
- Calcium Silicate
- Fiberglass
- NUKON
- Stainless Steel

Environments

The Piping and Component Insulation Commodity Group is exposed to the following environments:

- Containment Atmosphere
- Indoor Air

Aging Effects Requiring Management

The following aging effects associated with the Piping and Component Insulation Commodity Group require management:

- None

Aging Management Programs

The following aging management programs manage the aging effects for the Piping and Component Insulation Commodity Group:

- None

Table 3.5.2.1.19, Summary of Aging Management Evaluation – Piping and Component Insulation Commodity Group summarizes the results of the aging management review for the Piping and Component Insulation Commodity Group.

3.5.2.2 AMR Results Consistent With The GALL Report for Which Further Evaluation is Recommended

NUREG 1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the LRA. For the Containments, Structures, and Component Supports, those programs are addressed in the following subsections.

3.5.2.2.1 PWR and BWR Containments

1. Aging of Inaccessible Concrete Areas

Cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack; and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in inaccessible areas of PWR concrete and steel containments; BWR Mark II concrete containments; and Mark III concrete and steel containments. The GALL report recommends further evaluation to manage the aging effects for inaccessible areas if the environment is aggressive.

This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment.

2. Cracks and distortion due to increased stress levels from settlement; Reduction of Foundation Strength due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program

   Cracking, distortion, and increase in component stress level due to settlement could occur in PWR concrete and steel containments and BWR Mark II concrete containments and Mark III concrete and steel containments. Also, reduction of foundation strength due to erosion of porous concrete subfoundations could occur in all types of PWR and BWR containments. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL report recommends no further evaluation if this activity is included in the scope of the applicant's structures monitoring program.

   This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment.

3. Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

   Reduction of strength and modulus of elasticity due to elevated temperatures could occur in PWR concrete and steel containments and BWR Mark II concrete containments and Mark III concrete and steel containments. The GALL report recommends further evaluation if any portion of the concrete containment components exceeds specified temperature limits, i.e., general area temperature 66°C (150°F) and local area temperature 93°C (200°F).

   The normal operating temperature inside the Oyster Creek Primary Containment drywell varies from 139°F (at elev. 55') to 256°F (at elev. 95'). The containment structure is a BWR Mark I steel containment, which is not affected by general area temperature of 150°F and local area temperature of 200°F. Concrete for the reactor pedestal, and the drywell floor slab (fill slab) are located below elev. 55' and are not exposed to the elevated temperature. The biological shield wall extends from elev. 37'-3" to elev. 82'-2" and is exposed to a temperature range of 139°F - 184°F. The wall is a composite steel-concrete cylinder surrounding the reactor vessel. It is framed with 27 in. deep wide flange columns covered with steel plate on both sides. The area between the plates is filled with high density concrete to satisfy the shielding requirements. The steel columns provide the intended structural support function and the encased high density concrete provides shielding requirements. The encased concrete is not accessible for inspection.

The elevated drywell temperature concern was evaluated as a part of the Integrated Plant Assessment Systematic Evaluation Program (SEP Topic III-7.B). The evaluation concluded that the temperature would not adversely affect the structural and shielding functions of the wall.

The elevated drywell temperature was also identified as a concern for the reactor building drywell shield wall. Further evaluation for this wall is discussed in subsection 3.5.2.2.2, item (8).

4. Loss of Material due to General, Pitting, and Crevice Corrosion in Inaccessible Areas of Steel Shell or Liner Plate

Loss of material due to general, pitting and crevice corrosion could occur in inaccessible areas of the steel containment shell or the steel liner plate for all types of PWR and BWR containments. The GALL report recommends further evaluation of plant-specific programs to manage this aging effect for inaccessible areas if specific criteria defined in the GALL report cannot be satisfied.

At Oyster Creek, the potential for loss of material, due to corrosion, in inaccessible areas of the containment drywell shell was first recognized in 1980 when water was discovered coming from the sand bed region drains. Corrosion was later confirmed by ultrasonic thickness (UT) measurements taken during the 1986 refueling outage. As a result, several corrective actions were initiated to determine the extent of corrosion, evaluate the integrity of the drywell, mitigate accelerated corrosion, and monitor the condition of containment surfaces. The corrective actions include extensive UT measurements of the drywell shell thickness, removal of the sand in the sand bed region, cleaning and coating exterior surfaces in areas where sand was removed, and an engineering evaluation to confirm the drywell structural integrity. A corrosion monitoring program was established, in 1987, for the drywell shell above the sand bed region to ensure that the containment vessel is capable of performing its intended functions. Elements of the program have been incorporated into the ASME Section XI, Subsection IWE (B.1.27) and provide for:

- Periodic UT inspections of the shell thickness at critical locations,
- Calculations which establish conservative corrosion rates,
- Projections of the shell thickness based on the conservative corrosion rates, and
- Demonstration that the minimum required shell thickness is in accordance with ASME code.

Additionally, the NRC was notified of this potential generic issue that later became the subject of NRC Information Notice 86-99 and Generic Letter

87-05. A summary of the operating experience, monitoring activities, and corrective actions taken to ensure that the primary containment will perform its intended functions is discussed below.

<u>Drywell Shell in the Sand Bed Region</u>:

The drywell shell is fabricated from ASTM A-212-61T Gr. B steel plate. The shell was coated on the inside surface with an inorganic zinc (Carboline carbozinc 11) and on the outside surface with "Red Lead" primer identified as TT-P-86C Type I. The red lead coating covered the entire exterior of the vessel from elevation 8' 11.25" (Fill slab level) to elevation 94' (below drywell flange). .

The sand bed region was filled with dry sand as specified by ASTM 633. Leakage of water from the sand bed drains was observed during the 1980 and 1983 refueling outages. A series of investigations were performed to identify the source of the water and its leak path. The results concluded that the source of water was from the reactor cavity, which is flooded during refueling outages.

As a result of the presence of water in the sand bed region, extensive UT thickness measurements (about 1000) of the drywell shell were taken to determine if degradation was occurring. These measurements corresponded to known water leaks and indicated that wall thinning had occurred in this region.

Because of reduced thickness readings, additional thickness measurements were obtained to determine the vertical profile of the thinning. A trench was excavated inside the drywell, in the concrete floor, in the area where thinning at the floor level was most severe. Measurements taken from the excavated trench indicated that thinning of the embedded shell in concrete were no more severe than those taken at the floor level and became less severe at the lower portions of the sand bed region. Conversely, measurements taken in areas where thinning was not identified at the floor level showed no indication of significant thinning in the embedded shell. Aside from UT thickness measurements performed by plant staff, independent analysis was performed by the EPRI NDE Center and the GE Ultra Image III "C" scan topographical mapping system. The independent tests confirmed the UT results. The GE Ultra Image results were used as baseline profile to track continued corrosion.

To validate UT measurements and characterize the form of damage and its cause (i.e., due to the presence of contaminants, microbiological species, or both) core samples of the drywell shell were obtained at seven locations. The core samples validated the UT measurements and confirmed that the corrosion of the drywell is due to the presence of oxygenated wet sand and exacerbated by the presence of chloride and sulfate in the sand bed region. A contaminate concentrating mechanism due to alternate wetting and drying of the sand may have also contributed to the corrosion phenomenon. It was therefore concluded that the optimum method for mitigating the corrosion is by (1) removal of the sand to break up the galvanic cell, (2) removal of the corrosion product from the shell and (3) application of a protective coating.

Removal of sand was initiated during 1988 by removing sheet metal from around the vent headers to provide access to the sand bed from the Torus room. During operating cycle 13 some sand was removed and access holes were cut into the sand bed region through the shield wall. The work was finished in December 1992 . After sand removal, the concrete surface below the sand was found to be unfinished with improper provisions for water drainage. Corrective actions taken in this region during 1992 included; (1) cleaning of loose rust from the drywell shell, followed by application of epoxy coating and (2) removing the loose debris from the concrete floor followed by rebuilding and reshaping the floor with epoxy to allow drainage of any water that may leak into the region. UT measurements taken from the outside after cleaning verified loss of material projections that had been made based on measurements taken from the inside of the drywell. There were, however, some areas thinner than projected; but in all cases engineering analysis determined that the drywell shell thickness satisfied ASME code requirements. The Protective Coating Monitoring and Maintenance Program was revised to include monitoring of the coatings of exterior surfaces of the drywell in the sand bed region.

The coated surfaces of the former sand bed region were subsequently inspected during refueling outages of 1994, 1996, 2000, and 2004. The inspections showed no coating failure or signs of deterioration. It is therefore concluded that corrosion in the sand bed region has been arrested and no further loss of material is expected. Monitoring of the coating in accordance with the Protective Coating Monitoring and Maintenance Program, will continue to ensure that the containment drywell shell maintains its intended function during the period of extended operation.

<u>Drywell Shell above Sand Bed Region</u>:

The UT investigation phase (1986 through 1991) also identified loss of material, due to corrosion, in the upper regions of the drywell shell. These regions were handled separately from the sand bed region because of the significant difference in corrosion rate and physical difference in design. Corrective action for these regions involved providing a corrosion allowance by demonstrating, through analysis, that the original drywell design pressure was conservative. Amendment 165 to the Oyster Creek Technical Specifications reduced the drywell design pressure from 62 psig to 44 psig. The new design pressure coupled with measures to prevent water intrusion into the gap between the drywell shell and the concrete will allow the upper portion of the drywell to meet ASME code requirements.

Originally, the knowledge of the extent of corrosion was based on UT measurements going completely around the inside of the drywell at several elevations. At each elevation, a belt-line sweep was used with readings taken on as little as 1" centers wherever thickness changed between successive nominal 6" centers. Six-by-six grids that exhibited the worst metal loss around each elevation were established using this approach and included in the Drywell Corrosion Inspection Program.

As experience increased with each data collection campaign, only grids showing evidence of a change were retained in the inspection program. Additional assurance regarding the adequacy of this inspection plan was obtained by a completely randomized inspection, involving 49 grids that showed that all inspection locations satisfied ASME code requirements. Evaluation of UT measurements taken through 2000 concluded that corrosion is no longer occurring at two (2) elevations, the 3rd elevation is undergoing a corrosion rate of 0.6 mils/year, while the 4th elevation is subject to 1.2 mils/year. The recent UT measurements (2004) confirmed that the corrosion rate continues to decline. The two elevations that previously exhibited no increase in corrosion continue the no corrosion increase trend. The rate of corrosion for the 3rd elevation decreased from 0.6 mils/year to 0.4 mils/year. The rate of corrosion for the 4th elevation decreased from 1.2 mils/year to 0.75 mils/year. After each UT examination campaign, an engineering analysis is performed to ensure the required minimum thickness is provided through the period of extended operation. Thus corrosion of the drywell shell is considered a TLAA further described in Section 4.7.2.

The corrective actions taken as discussed above and the continued monitoring of the drywell for loss material through ASME Section XI, Subsection IWE, the Protective Coating Monitoring and Maintenance Program, and 10 CFR Part 50, Appendix J provide reasonable assurance that loss of material in inaccessible areas of the drywell will be detected prior to a loss of an intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The ASME Section XI, Subsection IWE, the Protective Coating Monitoring and Maintenance, and 10 CFR Part 50 Appendix J programs are described in Appendix B.

5. Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature

   Loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for PWR prestressed concrete containments and BWR Mark II prestressed concrete containments is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.5 of this standard review plan.

   This is applicable only to PWR and BWR prestressed concrete containments. It is not applicable to the Oyster Creek Mark I steel containment.

6. Cumulative Fatigue Damage

   If included in the current licensing basis, fatigue analyses of containment steel liner plates and steel containment shells (including welded joints) and penetrations (including penetration sleeves, dissimilar metal welds, and penetration bellows) for all types of PWR and BWR containments and BWR vent header and downcomers are TLAAs as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.6 of the standard review plan.

   At Oyster Creek, cumulative fatigue damage of the primary containment penetration sleeves, penetration bellows, suppression chamber (torus), vent header, downcomers, vent line bellows, main steam expansion joints inside the drywell, and containment vacuum breakers system piping, piping components, and expansion joints is a TLAA as defined in 10 CFR 54.3. The TLAA is evaluated in accordance with 10 CFR 54.21 (c). Evaluation of this TLAA is discussed in Section 4.6

7. Cracking due to Cyclic Loading and Stress Corrosion Cracking

   Cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading or SCC could occur in all types of PWR and BWR containments. Cracking could also occur in vent line bellows, vent headers and downcomers due to SCC for BWR containments. A visual VT-3 examination would not detect such cracks. Moreover, stress corrosion cracking is a concern for dissimilar metal welds. The GALL report recommends further evaluation of the inspection methods implemented to detect these aging effects.

   At Oyster Creek, cracking of containment penetrations (including penetration sleeves, penetration bellows, and dissimilar metal welds) due to cyclic loading is considered metal fatigue and is addressed as a TLAA in Section 4.6.

   Stress corrosion cracking (SCC) is an aging mechanism that requires the simultaneous action of a corrosive environment, sustained tensile stress, and a susceptible material. Elimination of any one of these elements will eliminate susceptibility to SCC. Stainless steel elements of primary containment and the containment vacuum breakers system, including dissimilar welds, are susceptible to SCC. However these elements are located inside the containment drywell or outside the drywell, in the reactor building, and are not subject to corrosive environment as discussed below.

   The drywell is made inert with nitrogen to render the primary containment atmosphere non-flammable by maintaining the oxygen content below 4% by volume during normal operation. The normal operating average temperature inside the drywell is less than 139°F and the relative humidity range is 20-40%. The reactor building normal operating temperature range is 65°F - 92°F; except in the trunion room where the temperature can reach 140°F. The relative humidity is 100% maximum. Both the containment atmosphere and indoor air environments are non-corrosive (chlorides <150 ppb, sulfates <100 ppb, and fluorides < 150 ppb).

Thus SCC is not expected to occur in the containment penetration bellows, penetration sleeves, and containment vacuum breakers expansion joints, piping and piping components, and dissimilar metal welds. A review of plant operating experience did not identify cracking of the components and primary containment leakage has not been identified as a concern. Therefore the existing 10 CFR Part 50 Appendix J leak testing and ASME Section XI, Subsection IWE, are adequate to detect cracking. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The ASME Section XI, Subsection IWE and 10 CFR Part 50 Appendix J programs are described in Appendix B.

8. Scaling, Cracking, and Spalling due to Freeze-Thaw; and Expansion and Cracking due to Reaction with Aggregate

   Scaling, cracking, and spalling due to freeze-thaw could occur in PWR and BWR concrete containments; and expansion and cracking due to reaction with aggregate could occur in concrete elements of PWR and BWR concrete and steel containments. Further evaluation is not necessary if stated conditions are satisfied for inaccessible areas

   This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment.

3.5.2.2.2 <u>Class I Structures</u>

1. Aging of Structures Not Covered by Structures Monitoring Program

   The GALL report recommends further evaluation of certain structure/aging effect combinations if they are not covered by the structures monitoring program. This includes (1) scaling, cracking, and spalling due to repeated freeze-thaw for Groups 1-3, 5, 7-9 structures; (2) scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 1-5, 7-9 structures; (3) expansion and cracking due to reaction with aggregates for Groups 1-5, 7-9 structures; (4) cracking, spalling, loss of bond, and loss of material due to general, pitting and crevice corrosion of embedded steel for Groups 1-5, 7-9 structures; (5) cracks and distortion due to increase in component stress level from settlement for Groups 1-3, 5, 7-9 structures; (6) reduction of foundation strength due to erosion of porous concrete subfoundation for Groups 1-3, 5-9 structures; (7) loss of material due to general, pitting and crevice corrosion of structural steel components for Groups 1-5, 7-8 structures; (8) loss of strength and modulus of concrete structures due to elevated temperatures for Groups 1-5; and (9) cracking due to SCC and loss of material due to crevice corrosion of stainless steel liner for Groups 7 and 8 structures. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

Technical details of the aging management issue are presented in Subsection 3.5.2.2.1.2 for items (5) and (6) and Subsection 3.5.2.2.1.3 for item (8).

Loss of material (spalling, scaling) and cracking due to freeze-thaw could occur in below-grade inaccessible concrete areas for Groups 1-3, 5, 7-9 structures; and expansion and cracking due to reaction with aggregates could occur in below-grade inaccessible concrete areas for Groups 1-5, 7-9 structures. The GALL report recommends further evaluation of plant-specific programs to manage the aging effects for inaccessible areas if specific criteria defined in the GALL report cannot be satisfied.

At Oyster Creek, the Structures Monitoring Program (B.1.31) is used to manage aging affects applicable to Groups 2,3, 4, and 8-9 structures as discussed below. The GALL structures Group 1 and Group 7 do not exist for Oyster Creek. Group 5, "Fuel Storage Facility", is included with Group 2 structures.

(1) Loss of material and cracking due to repeated freeze-thaw for Groups 2,3, and 8-9 structures are managed through the Structures Monitoring Program and thus a further evaluation is not necessary.

(2) Scaling, cracking, spalling and increase in porosity and permeability due to leaching of calcium hydroxide and aggressive chemical attack for Groups 2, 4, and 8-9 structures are not applicable. The structures are not exposed to aggressive environment or water – flowing environment. Group 3 structures are also not exposed to aggressive, or water – flowing environments except for the Fire Water Pumphouses (fresh water pumphouse only), and the service water seal well (included with Miscellaneous Yard structures). The structures are within the scope of Structures Monitoring Program and inspected as described in Appendix B.

(3) Cracking due to reaction with aggregates for Groups 2-4, and 8-9 structures is monitored through Structures Monitoring Program, and thus a further evaluation is not necessary.

(4) Loss of material, cracking, and change in material properties due to corrosion of embedded steel for Groups 2-4, and 8-9 structures are monitored through the Structures Monitoring Program and thus a further evaluation is not required.

(5) The Structures Monitoring Program will be used to manage Cracks and distortion due to increase in component stress level from settlement for Groups 2-4, and 8-9 structures. However this aging mechanism is insignificant for Oyster Creek structures because the structures are founded on highly dense soil. Evaluation of soil explorations, during the original construction, predicted no more than 1" settlement for Class I structures. Observed settlement of the reactor building has ranged from 0.33" – 0.75" and was essentially complete soon after construction. Thus a settlement monitoring

program is not required; nor is a de-watering system relied upon in the CLB to control settlement.

(6) Reduction of foundation strength due to erosion of porous concrete sub foundation for Groups 2-4, and 8-9 structures. This aging effect and mechanism is not applicable to Oyster Creek. The Oyster Creek design does not include porous concrete into the sub foundation of Groups 2-4 and 8-9 structures.

(7) Loss of material due to general, pitting and crevice corrosion of structural steel components for Groups 2-4, and 9 structures is monitored through the Structures Monitoring Program, and thus a further evaluation is not required.

(8) For loss of strength and modulus of concrete structures due to elevated temperatures for Groups 2-5, GALL recommends a Plant Specific AMP and further evaluation if the general temperature is greater than 150°F or if the local temperature is greater than 200°F. For Oyster Creek, the Structures Monitoring Program is used to manage cracking of concrete structures exposed to elevated temperatures.

Concrete temperature limits specified in the GALL report are exceeded only in a section of the reactor building (Group 2) drywell shield wall that encloses the containment drywell head. Thermocouples mounted on the head, in the general area of the shield wall, indicated a maximum temperature of 285°F. Engineering analysis predicted that the average temperature through the 5’ thick concrete wall could be in the range of 180°F-215°F; considering a worst case thermal environment inside the containment of 340°F. As a result, an investigation was initiated to evaluate the impact of the elevated temperature on the structural integrity of the shield wall. The initial inspection of the shield wall identified concrete cracking in the area that is subject to high temperature. A map of the cracked area that includes crack length and width was developed for future monitoring.

Subsequently, an engineering evaluation was conducted to assess the impact of the elevated temperature on the drywell shield wall. For this purpose, a finite element model was created considering geometry of the shield wall and structural elements connected to it. The analysis was based on a temperature of 285°F and a reduced concrete compressive strength that accounts for temperature-induced reduction. The results concluded that concrete and rebar stress limits are in accordance with ACI 349 criteria with an adequate safety margin. NRC staff review found the analysis acceptable and concluded that the wall is capable of performing its intended function. The Staff also recommended condition monitoring of the drywell shield wall to ensure its continued function. The wall has been included in the scope of the Structures Monitoring Program and inspected periodically to ensure its continued function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

(9) Cracking due to SCC and loss of material due to crevice corrosion of stainless steel liner are not in the scope of Structures Monitoring Program. Instead, the aging effects are managed through the Water Chemistry Program (B.1.2) and monitoring of spent fuel pool water level, consistent with the GALL AMP. Therefore a further evaluation is not necessary.

At Oyster Creek, the Structures Monitoring Program (B.1.31) is used to manage concrete aging effects due to various aging mechanisms. The program requires periodic inspection of accessible areas and inspection of inaccessible areas when they become accessible. The below-grade concrete structures are inspected, when excavated for any reason. In addition, the criteria defined in the GALL report is satisfied as discussed below.

Oyster Creek is located in a moderate to severe weathering conditions. As a result loss of material (spalling, scaling) and cracking due to free-thaw is applicable to Groups 2-3 and 8-9 structures. However these concrete structures are designed and constructed in accordance with ACI 318 and provide for low permeability and adequate air entrainment (4% - 6%) such that the concrete is not susceptible to freeze-thaw aging effects. Inspections of accessible areas have identified cracks on the exterior walls of the reactor building. The cracks have been attributed to a combination of early concrete shrinkage, expansion, and contraction due to temperature variation. Spalling and scaling of any significance have not been observed.

At Oyster Creek, expansion and cracking due to reaction with aggregates could occur in below-grade inaccessible concrete areas for Groups 2-4, and 8-9 structures.

At Oyster Creek, concrete specifications require Type II; low alkali cement shall be used. Alkali content is limited to 0.6 per cent total alkali unless tests performed in accordance with ASTM C295 and C227 demonstrate no potential for alkali reactivity for the aggregate.

Inspection activities in accordance with the Structures Monitoring Program described above, in conjunction with concrete quality that meets ACI 318, ASTM 295, and ASTM C227 standards, provide reasonable assurance that the below-grade concrete will perform its intended function. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

2. Aging Management of Inaccessible Areas

   Cracking, spalling, and increases in porosity and permeability due to aggressive chemical attack; and cracking, spalling, loss of bond, and loss of material due to corrosion of embedded steel could occur in below-grade inaccessible concrete areas. The GALL report recommends further evaluation to manage these aging effects in inaccessible areas of Groups 1-3, 5, 7-9 structures.

   Recent Oyster Creek groundwater analysis results (pH: 5.6 – 6.4, chlorides: 3 - 138 ppm, and sulfates: 7 – 73 ppm) have shown that the groundwater at Oyster Creek is not aggressive for Groups 2-3, 8-9 structures. Therefore further evaluation of below-grade inaccessible concrete areas for Groups 2, and 8-9 structures is not required. Similarly inaccessible areas of Group 3 structures are not exposed to aggressive environment except for Fire Water Pumphouses (fresh water pumphouse only). Further evaluation of group 3 structures, other than fresh water pumphouse is not required.

   The fresh water pumphouse reinforced concrete is subject to slightly aggressive water from the Fire Pond Dam (pH: 4.8, chlorides = 12 ppm, and sulfates = 6 ppm). Inaccessible areas will be inspected if excavated for any reason, or if observed conditions in accessible areas, which are exposed to the same environment, show that significant concrete degradation is occurring.

   The Structures Monitoring Program will be enhanced to include periodic groundwater monitoring in order to demonstrate that the below grade environment remains non-aggressive. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The Structures Monitoring Program is described in Appendix B.

3.5.2.2.3 <u>Component Supports</u>

1. Aging of Supports Not Covered by Structures Monitoring Program

   The GALL report recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structures monitoring program. This includes (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports; (2) loss of material due to environmental corrosion, for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements, for Group B4 supports. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program.

   At Oyster Creek, (1) reduction in concrete anchor capacity due to degradation of the surrounding concrete, for Groups B1-B5 supports, (2) loss of material for Groups B2-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements for Group B4 supports are covered under the Structures Monitoring Program.

The Structures Monitoring Program will be used to manage loss of material on exterior surfaces of piping, piping components, HVAC components and ductwork, tanks, and other mechanical components located in outdoor air environment. The program will also be used to manage loss of material and change in material properties of exterior surfaces of mechanical system components in indoor air environment as described in Appendix (B.1.31) and as evaluated in sections 3.1, 3.2, 3.3, and 3.4 of this application.

Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the Corrective Action Process. The Structures Monitoring Program is described in Appendix B.

2. Cumulative Fatigue Damage Due To Cyclic Loading

   Fatigue of support members, anchor bolts, and welds for Groups B1.1, B1.2, and B1.3 component supports is a TLAA as defined in 10 CFR 54.3 only if a CLB fatigue analysis exists. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3 of the standard review plan.

   At Oyster Creek, there are no fatigue analyses applicable to Groups B1.1, and B1.2 component supports in the CLB. Therefore, cumulative fatigue damage for Groups B1.1 and B1.2 component supports is not a TLAA as defined in 10 CFR 54.3.

   The Oyster Creek CLB includes fatigue analysis for certain Group B1.3, ASME Class MC component supports. For these supports (Torus support columns and sway braces), cumulative fatigue damage is a TLAA evaluated in accordance with 10 CFR 54.21(c) in Section 4.6.1.

3.5.2.3 <u>Time-Limited Aging Analysis</u>

The time-limited aging analyses identified below are associated with the Primary Containment, Structures, and Component Supports components:

- Section 4.6, Primary Containment, Attached Piping and Components
- Section 4.7.1, Reactor Building Crane, Turbine Building Crane, Heater Bay Crane Load Cycles
- Section 4.7.2, Drywell Corrosion
- Section 4.7.3, Equipment Pool and Reactor Cavity Walls Rebar Corrosion

3.5.3 CONCLUSION

The Primary Containment, Structures, Component Supports, and Piping and Component Insulation components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Primary Containment, Structures, Component Supports, and Piping and Component Insulation components are identified in the summaries in Section 3.5.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Primary Containment, Structures, and Component Supports components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-1	BWR/ PWR	Penetration sleeves, penetration bellows, dissimilar metal welds, and downcomers	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.5.2.2.1.6
3.5.1-2	BWR/ PWR	Penetration sleeves, bellows, dissimilar metal welds, and downcomers.	Cracking due to cyclic loading, or cracking due to SCC	Containment ISI and Containment leak rate test	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801, with exceptions. Cracking due to cyclic loading is TLAA, as defined in 10 CFR 54.3. The TLAA is evaluated in accordance with 10CFR54.21(c) in Section 4.6. SSC is not an applicable aging mechanism for penetration sleeves, bellows, containment vacuum breakers stainless steel components, and dissimilar metal welds. For this mechanism to occur, both high temperature and exposure to corrosive environment are required. The normal operating environment for the components is not aggressive and the temperature is not greater than 140^{o}F. Thus cracking due to SCC is not a concern as confirmed by Oyster Creek operating experience review. The ASME Section XI, Subsection IWE, B.1.27, examinations and 10 CFR Part 50, Appendix J, B.1.29, testing are adequate to ensure that the containment pressure boundary function is maintained. Exceptions apply to the NUREG-1801 ASME Section XI, Subsection IWE. See Subsection 3.5.2.2.1.7.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-3	BWR/ PWR	Penetration sleeves, penetration bellows, and dissimilar metal welds	Loss of material due to general, pitting and crevice corrosion	Containment ISI and Containment leak rate test	No	Consistent with NUREG-1801, with exceptions. The ASME Section XI, Subsection IWE, B.1.27, and 10 CFR Part 50, Appendix J, B.1.29, will be used to manage loss of material for penetration sleeves, penetration bellows and dissimilar metal welds. Exceptions apply to the NUREG-1801 ASME Section XI, Subsection IWE
3.5.1-4	BWR/ PWR	Personnel airlock, equipment hatch and CRD hatch	Loss of material due to general, pitting and crevice corrosion	Containment ISI and Containment leak rate test	No	Consistent with NUREG-1801, with exceptions. The ASME Section XI, Subsection IWE, B.1.27, and 10 CFR Part 50, Appendix J, B.1.29, will be used to manage loss of material for Personnel airlock/equipment hatch. Exceptions apply to the NUREG-1801 ASME Section XI, Subsection IWE
3.5.1-5	BWR/ PWR	Personnel airlock, equipment hatch and CRD hatch	Loss of leak tightness in closed position due to mechanical wear of locks, hinges and closure mechanism	Containment leak rate test and Plant Technical Specifications	No	Consistent with NUREG-1801. The 10 CFR Part 50 Appendix J will be used to confirm loss of leak tightness of Personnel airlock/equipment hatch in closed position in accordance with Oyster Creek Technical Specifications.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-6	BWR/ PWR	Seals, gaskets, and moisture barriers	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and Containment leak rate test	No	Consistent with NUREG-1801, with exceptions. The ASME Section XI, Subsection IWE, B.1.27, and 10 CFR Part 50, Appendix J, B.1.29, will be used to manage Loss of Sealant and leakage through the primary containment due to deterioration of seals and gaskets. Exceptions apply to the NUREG-1801 ASME Section XI, Subsection IWE
3.5.1-7	BWR/ PWR	Concrete elements: foundation, walls, and domes.	Aging of accessible and inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Containment ISI and for inaccessible concrete, an examination of representative samples of below-grade concrete, when excavated for any reason, be performed, if the below-grade environment is aggressive	Yes, if the environment is aggressive	This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment. See Subsection 3.5.2.2.1.1

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-8	BWR/ PWR	Concrete elements: foundation, walls, dome.	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide.	Containment ISI	No, if concrete was constructed as stated for inaccessible areas.	This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment.
3.5.1-9	BWR/ PWR	Concrete elements: All	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment. See Subsection 3.5.2.2.1.2
3.5.1-10	BWR/ PWR	Concrete elements: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment. See Subsection 3.5.2.2.1.2

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-11	BWR/ PWR	Concrete elements: foundation, dome, and wall	Reduction of strength and modulus due to elevated temperature	Plant specific	Yes, for any portions of concrete containment that exceed specified temperature limits	This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment. Elevated temperature inside the drywell has been evaluated as described in Subsection 3.5.2.2.1.3
3.5.1-12	BWR/ PWR	Prestressed containment: tendons and anchorage components	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This is applicable only to PWR and BWR prestressed concrete containments. It is not applicable to the Oyster Creek Mark I steel containment. See Subsection 3.5.2.2.1.5

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-13	BWR/ PWR	Steel elements: liner plate, containment shell downcomers, drywell support skirt, ECCS suction header	Loss of material due to general, pitting and crevice corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	Yes, if corrosion is significant for inaccessible areas	Consistent with NUREG-1801 with exceptions. The ASME Section XI, Subsection IWE, B.1.27, and 10 CFR Part 50, Appendix J, B.1.29 will be used to manage loss of material for steel elements of the primary containment. In addition loss of material of the drywell is considered a TLAA and evaluated in accordance with 10CFR54.21(c). The ASME Section XI, Subsection IWE, B.1.27, 10 CFR Part 50, Appendix J, B.1.29, will also be used to manage loss of material of the containment vacuum breakers system piping and piping components. Exceptions apply to the NUREG-1801 ASME Section XI, Subsection IWE Loss of material due to corrosion, in the sand bed region and on the exterior surfaces of the upper region of drywell, was identified as a potential concern in early 1980's. As a result, the sand was removed from the sand bed region and a protective coating was applied to the drywell exterior surfaces in that region. The upper regions of the drywell shell are examined periodically by ultrasonic (UT) measurements and evaluated to ensure that the actual thickness meets ASME requirements. See Subsection 3.5.2.2.1.4.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-14	BWR	Steel elements: vent header, drywell head, torus, downcomers, pool shell	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA; further evaluation is documented in Subsection 3.5.2.2.1.6.
3.5.1-15	BWR/ PWR	Steel elements: protected by coating	Loss of material due to general, pitting and crevice corrosion in accessible areas only	Protective coating monitoring and maintenance	No	Consistent with NUREG-1801. The Protective Coating Monitoring and Maintenance Program, B.1.33 will be used to manage loss of material of internal surfaces of the primary containment steel elements, including the suppression chamber surfaces immersed in treated water, exterior surfaces of the vent lines, and on the exterior surfaces of the drywell in the former sand bed region. The program is in addition to ASME Section XI, Subsection IWE, 10 CFR Part 50 Appendix J, and TLAA, as applicable.
3.5.1-16	BWR/ PWR	Prestressed containment: tendons and anchorage components	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	No	This is applicable only to PWR and BWR prestressed concrete containments. It is not applicable to the Oyster Creek Mark I steel containment.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-17	BWR/ PWR	Concrete elements: foundation, dome, and wall	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI	No, if stated conditions are satisfied for inaccessible areas	This is applicable only to PWR and BWR concrete containments. It is not applicable to the Oyster Creek Mark I steel containment. See Subsection 3.5.2.2.1.8.
3.5.1-18	BWR	Steel elements: vent line bellows, vent headers, downcomers	Cracking due to cyclic loads or Cracking due to SCC	Containment ISI and Containment leak rate test	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801, with exceptions. Cracking due to cyclic loads is a TLAA; refer to section 4.6. The ASME Section XI, Subsection IWE, B.1.27, and 10 CFR Part 50, Appendix J, B.1.29, will be used to manage Cracking due SCC of the vent line bellows, stainless components in the containment vacuum breakers system, and dissimilar welds. Exceptions apply to the NUREG-1801 ASME Section XI, Subsection IWE. See Subsection 3.5.2.2.1.7.
3.5.1-19	BWR	Steel elements: Suppression chamber liner	Cracking due to SCC	Containment ISI and Containment leak rate test	No	Not Applicable. Oyster Creek has Mark I Steel Containment. The Suppression chamber is carbon steel shell not stainless steel liner

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-20	BWR	Steel elements: drywell head and downcomer pipes	Fretting and lock up due to wear	Containment ISI	No	Consistent with NUREG-1801, with exceptions. The ASME Section XI, Subsection IWE, B.1.27 will be used to manage fretting and lock up of the drywell head and downcomer pipes.
3.5.1-21	BWR/ PWR	All Groups except Group 6: accessible and inaccessible interior/exterior concrete, steel & Lubrite components	All types of aging effects	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program and a plant-specific aging management program is required for inaccessible areas as stated	Consistent with NUREG-1801. The Structures Monitoring Program, B.1.31, will be used to manage aging effects of all Groups of structures and components, except Group 6, in all environments including inaccessible areas. See Subsection 3.5.2.2.2.1.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-22	BWR/ PWR	Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Examination of representative samples of below-grade concrete, when excavated for any reason, be performed, if the below-grade environment is aggressive	Yes, if environment is aggressive	Consistent with NUREG-1801. Recent Oyster Creek groundwater analysis results have shown that the groundwater at Oyster Creek is not aggressive for Groups 2-3, 8-9 structures; except for the fresh water Fire Pumphouse. Therefore further evaluation of below-grade inaccessible concrete areas for Groups 2, 3, and 8-9 structures, other than the fresh water pumphouse, is not required. The Structures Monitoring Program, B.1.31, will be enhanced to include periodic groundwater monitoring in order to demonstrate that the below grade environment is non-aggressive. The existing program requires inspection of underground structures when they become uncovered. See Subsection 3.5.2.2.2.2.
3.5.1-23	BWR/ PWR	Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation	Aging of inaccessible concrete areas due to leaching of calcium hydroxide	None, if concrete was constructed as stated.	No, if concrete was constructed as stated for inaccessible areas.	Not applicable. The GALL report recommends further evaluation of inaccessible concrete if the structures are exposed to flowing water environment. The Oyster Creek inaccessible concrete for Groups 2-3, and 8-9 structures is not subject to a flowing water environment.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-24	BWR/ PWR	Group 6: all accessible/ inaccessible concrete, metal, and earthen components	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of Water-Control Structures or FERC/US Army Corps of Engineers dam inspections and maintenance	No	Consistent with NUREG-1801. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants, B.1.32, will be used to manage aging of Group 6 structures. The program includes aging management of accessible/inaccessible concrete, metal, and earthen components.
3.5.1-25	BWR/ PWR	Group 5: Fuel pool liners	Cracking due to SCC and loss of material due to pitting and crevice corrosion	Water Chemistry Program and Monitoring of spent fuel pool water level	No	Consistent with NUREG-1801 with exceptions. The Water Chemistry Program, B.1.2, and the monitoring of spent fuel pool water level, as required by Oyster Creek Technical Specifications, will be used to manage cracking and loss of material of the spent fuel pool liner. Exceptions apply to the NUREG-1801 Water Chemistry program.
3.5.1-26	BWR/ PWR	Groups 1-3, 5, 6: all masonry block walls	Cracking due to restraint shrinkage, creep, and aggressive environment	Masonry Wall	No	Consistent with NUREG-1801. The Masonry Wall Program, B.1.30, will be used to manage cracking of masonry block walls.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-27	BWR/ PWR	Groups 1-3, 5, 7-9: foundation	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program, B.1.31, will be used to manage cracks and distortion due to increase in component stress level from settlement for Groups 2,3, and 8-9 structures. However this aging mechanism is insignificant for Oyster Creek structures because the structures are founded on highly dense soil. Evaluation of soil explorations, during the original construction, predicted no more than 1" settlement for Class I structures. Observed settlements of the reactor building have ranged from 0.33" – 0.75" inches and essentially complete soon after construction. Thus a settlement-monitoring program is not required; nor is a de-watering system relied upon in CLB to control settlement. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants, B.1.32, which is a part of the Structures Monitoring Program, will be used to manage cracks and distortion due to increase in component stress level from settlement for Group 6 structures. See Subsection 3.5.2.2.2.1

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-28	BWR/ PWR	Groups 1-3, 5-9: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Not Applicable. The aging effect is applicable only to structures whose foundation includes porous concrete subfoundation. Subfoundations of Oyster Creek structures do not include porous concrete. See Subsection 3.5.2.2.2.1
3.5.1-29	BWR/ PWR	Groups 1-5: concrete	Reduction of strength and modulus due to elevated temperature	Plant-specific	Yes, for any portions of concrete that exceed specified temperature limits	The Structures Monitoring Program, B.1.31, will be used to manage change in material properties due to elevated temperature. Aging management reviews determined that the local temperature (200^{o} F) and the general temperature (150^{o} F) limits are exceeded only in the upper elevation of the containment drywell. In this region, temperature readings up to 285^{o} F were recorded. This elevated temperature was determined to be the cause of cracking discovered on the exterior surfaces of the reactor building drywell shield wall (Group 2 structures) above the containment drywell head. Engineering evaluation concluded that the elevated temperature does not adversely impact the structural integrity of the wall and the wall will continue to perform its intended function. The cracks were mapped, inspected periodically, and evaluated to ensure that the wall will continue to perform its intended function. See Subsection 3.5.2.2.2.1

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-30	BWR/ PWR	Groups 7, 8: Tank liners	Cracking due to SCC; Loss of material due to pitting and crevice corrosion	Plant-specific	Yes, plant-specific	Not Applicable. The only stainless steel lined concrete tank at Oyster Creek is the spent fuel pool surge tank. Aging effects of the stainless steel tank liner are evaluated with the mechanical auxiliary systems.
3.5.1-31	BWR/ PWR	Group 6: Seals, gaskets, and moisture barriers	Loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Structures Monitoring	No	Not Applicable. This line item is not listed in NUREG-1801, Vol. 2 aging management review tables for structures and component supports

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-32	BWR/ PWR	All groups except 6: Radial beam seats in BWR drywell; RPV support shoes for PWR with nozzle supports; Steam generator supports	Lock-up due to wear	ISI or Structures monitoring	No, if within the scope of the applicant's structures monitoring program or ISI	Not Applicable. The Oyster Creek radial beam design does not include Lubrite plates.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-33	BWR/ PWR	All Groups: support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc.	Aging of component supports	Structures Monitoring	No, if within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. The Structures Monitoring Program, B.1.31, will be used to manage aging effects of component support members. The program will also be used to manage loss of material of exterior surfaces of piping, piping components, HVAC components and ductwork, tanks, flame arrestor, and closure bolting located in outdoor air environment. See Subsection 3.5.2.2.3.1.
3.5.1-34	BWR/ PWR	All Groups: stainless steel support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc.	None	None	NA-no AE/M or AMP	Consistent with NUREG-1801.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-35	BWR/ PWR	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	Fatigue is a TLAA only for B1.3 support members; further evaluation is documented in Subsection 3.5.2.2.3.2.
3.5.1-36	PWR	All Groups: support members: anchor bolts, welds	Loss of material due to boric acid corrosion	Boric acid corrosion	No	This is applicable to PWRs Only

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

Item Number	Type	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-37	BWR/ PWR	Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds, spring hangers, guides, stops, and vibration isolators; radial beam seats in BWR drywell, RPV support shoes for PWR with nozzle supports, other supports	Loss of material due to general and pitting corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI Structures Monitoring	No No, if within the applicant's structures monitoring program.	Consistent with NUREG-1801, with exceptions. The ASME Section XI, Subsection IWF, B.1.28, will be used to manage loss of material and loss of mechanical function for Groups B1.1, B1.2, and B1.3 support members.
3.5.1-38	BWR/ PWR	Group B1.1: high strength low-alloy bolts	Cracking due to SCC	Bolting integrity	No	Not applicable. There are no Group B.1.1 high strength low-alloy bolts.

Table 3.5.2.1.1
Primary Containment
Summary of Aging Management Evaluation

Table 3.5.2.1.1 Primary Containment

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Access Hatch Covers	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-5 (C-16)	3.5.1-4	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-5 (C-16)	3.5.1-4	D
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B4-5 (C-16)	3.5.1-15	C
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-5 (C-16)	3.5.1-4	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-5 (C-16)	3.5.1-4	D
Beam Seats	Structural Support	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	A
Biological Shield Wall - Concrete	Shielding	Concrete (high density)	Encased	None	None			J, 1
Biological Shield Wall - Lateral Support	Structural Support	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Biological Shield Wall - Liner Plate	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	C
Biological Shield Wall - Structural Steel	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	A
Cable Tray	Structural Support	Galvanized Steel	Containment Atmosphere	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Class MC Pressure Retaining Bolting	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	V.E-4 (EP-25)	3.2.1-25	E, 2
				Loss Of Preload	10 CFR Part 50, Appendix J (B.1.29)	V.E-5 (EP-24)	3.2.1-25	E, 2
			Indoor Air	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	V.E-4 (EP-25)	3.2.1-25	E, 2
				Loss Of Preload	10 CFR Part 50, Appendix J (B.1.29)	V.E-5 (EP-24)	3.2.1-25	E, 2
Concrete embedment	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete embedment	Structural Support	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	C
Conduits	Enclosure Protection	Galvanized Steel	Containment Atmosphere	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Containment Atmosphere	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Downcomers	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A
			Treated Water < 140F	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G, 3
				Fretting or lockup	ASME Section XI, Subsection IWE (B.1.27)			G, 3
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)			G, 3

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Downcomers	Pressure Boundary	Carbon and low alloy steel	Treated Water < 140F	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)			G, 3
					Protective Coating Monitoring and Maintenance Program (B.1.33)			G, 3
Drywell Head	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Fretting or lockup	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-1 (C-23)	3.5.1-20	B
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
	Structural Support	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Drywell Head	Structural Support	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
Drywell Penetration Bellows	Pressure Boundary	Stainless Steel, Dissimilar Metal Welds	Containment Atmosphere (Internal)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B4-2 (C-15)	3.5.1-2	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-2 (C-15)	3.5.1-2	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B4-4 (C-13)	3.5.1-1	A
			Indoor Air (External)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B4-2 (C-15)	3.5.1-2	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-2 (C-15)	3.5.1-2	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B4-4 (C-13)	3.5.1-1	A
Drywell Penetration Sleeves	Pressure Boundary	Carbon and low alloy steel, Dissimilar Metal Welds	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Drywell Penetration Sleeves	Pressure Boundary	Carbon and low alloy steel, Dissimilar Metal Welds	Containment Atmosphere (Internal)	Loss of Material	Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B4-1 (C-12)	3.5.1-15	A
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B
		Stainless Steel	Containment Atmosphere (Internal)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B4-2 (C-15)	3.5.1-2	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-2 (C-15)	3.5.1-2	B
			Indoor Air (External)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B4-2 (C-15)	3.5.1-2	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-2 (C-15)	3.5.1-2	B
	Structural Support	Carbon and low alloy steel, Dissimilar Metal Welds	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Drywell Penetration Sleeves	Structural Support	Carbon and low alloy steel, Dissimilar Metal Welds	Containment Atmosphere (Internal)	Loss of Material	Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B4-1 (C-12)	3.5.1-15	A
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B
		Stainless Steel	Containment Atmosphere (Internal)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B4-2 (C-15)	3.5.1-2	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-2 (C-15)	3.5.1-2	B
			Indoor Air (External)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B4-2 (C-15)	3.5.1-2	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-2 (C-15)	3.5.1-2	B
Drywell Shell	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Drywell Shell	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A
					TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-2 (C-19)	3.5.1-13	E, 4
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A, 5
					TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1.2 (C-19)	3.5.1-13	E, 4
	Structural Support	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Drywell Shell	Structural Support	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-2 (C-19)	3.5.1-13	E, 4
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A, 5
					TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-2 (C-19)	3.5.1-13	E, 4
Drywell Support Skirt	Structural Support	Carbon and low alloy steel	Concrete	None	None	II.B1.1-2 (C-19)	3.5.1-13	I, 6
Liner (Sump)	Leakage Boundary	Stainless Steel	Concrete (External)	None	None	VII.J-19 (AP-19)	3.3.1-78	C
			Containment Atmosphere (Internal)	None	None	VII.J-17 (AP-17)	3.3.1-76	C
			Raw Water – Fresh Water (Internal)	Loss of Material	Structures Monitoring Program (B.1.31)			G
Locks, Hinges, and Closure Mechanisms	Pressure Boundary	Bronze	Containment Atmosphere (Internal)	Loss of Leak Tightness	10 CFR Part 50, Appendix J (B.1.29)			F, 9

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Locks, Hinges, and Closure Mechanisms	Pressure Boundary	Bronze	Indoor Air (External)	Loss of Leak Tightness	10 CFR Part 50, Appendix J (B.1.29)			F, 9
		Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Leak Tightness	10 CFR Part 50, Appendix J (B.1.29)	II.B4-6 (C-17)	3.5.1-5	A, 9
			Indoor Air (External)	Loss of Leak Tightness	10 CFR Part 50, Appendix J (B.1.29)	II.B4-6 (C-17)	3.5.1-5	A, 9
			Containment Atmosphere (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
			Indoor Air (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
Miscellaneous Steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	A
		Galvanized Steel	Containment Atmosphere	None	None	VII.J-8 (AP-13)	3.3.1-74	C

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Panels and Enclosures	Enclosure Protection	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Containment Atmosphere (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C
	Structural Support	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Containment Atmosphere (External)	None	None	VII.J-8 (AP-13)	3.3.1-74	C
		Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C
Penetration Closure Plates and Caps (spare penetrations)	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	C

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetration Closure Plates and Caps (spare penetrations)	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
Personnel Airlock/Equipment Hatch	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-5 (C-16)	3.5.1-4	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-5 (C-16)	3.5.1-4	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B4-5 (C-16)	3.5.1-15	A
			Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-5 (C-16)	3.5.1-4	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-5 (C-16)	3.5.1-4	B
Reactor Pedestal	Structural Support	Concrete	Containment Atmosphere	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A4-4 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A4-2 (T-03)	3.5.1-21	A
						III.A4-4 (T-04)	3.5.1-21	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reactor Pedestal	Structural Support	Concrete	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-4 (T-04)	3.5.1-21	A
				None	None	III.A4-1 (T-10)	3.5.1-29	I, 7
Reinforced Concrete Floor Slab (fill slab)	Enclosure Protection	Concrete	Containment Atmosphere (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A4-4 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A4-2 (T-03)	3.5.1-21	A
						III.A4-4 (T-04)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-4 (T-04)	3.5.1-21	A
				None	None	III.A4-1 (T-10)	3.5.1-29	I, 7
	Structural Support	Concrete	Containment Atmosphere (External)	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A4-4 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A4-2 (T-03)	3.5.1-21	A
						III.A4-4 (T-04)	3.5.1-21	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Floor Slab (fill slab)	Structural Support	Concrete	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-4 (T-04)	3.5.1-21	A
				None	None	III.A4-1 (T-10)	3.5.1-29	I, 7
Seals, Gaskets, and O-rings	Pressure Boundary	Elastomer	Containment Atmosphere (External)	Loss of Sealing	10 CFR Part 50, Appendix J (B.1.29)	II.B4-7 (C-18)	3.5.1-6	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-7 (C-18)	3.5.1-6	B
Shielding Blocks and Plates	Shielding	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	C
		Permali	Containment Atmosphere (External)	None	None			J, 3
Structural Bolting	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 8
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E, 8
Structural Steel (radial beams, posts, bracing, plate, connections, etc.)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Steel (radial beams, posts, bracing, plate, connections, etc.)	Structural Support	Stainless Steel	Containment Atmosphere	None	None	VII.J-17 (AP-17)	3.3.1-76	C
Suppression Chamber Penetrations	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B4-4 (C-13)	3.5.1-1	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B4-4 (C-13)	3.5.1-1	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G, 3

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Suppression Chamber Penetrations	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)			G, 3
					ASME Section XI, Subsection IWE (B.1.27)			G, 3
					Protective Coating Monitoring and Maintenance Program (B.1.33)			G, 3
	Structural Support	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B4-4 (C-13)	3.5.1-1	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B4-1 (C-12)	3.5.1-15	A
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B4-4 (C-13)	3.5.1-1	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B4-1 (C-12)	3.5.1-3	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Suppression Chamber Penetrations	Structural Support	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	II.B4-1 (C-12)	3.5.1-3	B
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G, 3
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)			G, 3
					ASME Section XI, Subsection IWE (B.1.27)			G, 3
					Protective Coating Monitoring and Maintenance Program (B.1.33)			G, 3
Suppression Chamber Ring Girders	Structural Support	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A
			Treated Water < 140F (External)	Loss of Material	ASME Section XI, Subsection IWE (B.1.27)			G, 3
					Protective Coating Monitoring and Maintenance Program (B.1.33)			G, 3

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Suppression Chamber Shell	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G, 3
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)			G, 3
					ASME Section XI, Subsection IWE (B.1.27)			G, 3

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Suppression Chamber Shell	Pressure Boundary	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	Protective Coating Monitoring and Maintenance Program (B.1.33)			G, 3
	Structural Support	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	A
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	B
			Treated Water <140F (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)			G, 3

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Suppression Chamber Shell	Structural Support	Carbon and low alloy steel	Treated Water <140F (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)			G, 3
					ASME Section XI, Subsection IWE (B.1.27)			G, 3
					Protective Coating Monitoring and Maintenance Program (B.1.33)			G, 3
Suppression Chamber Shell Hoop Straps	Structural Support	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
Thermowells	Pressure Boundary	Carbon and low alloy steel	Indoor Air (External)	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-7 (A-77)	3.3.1-12	E
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-19 (A-35)	3.3.1-15	A
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	B
		Stainless Steel	Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	A
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowells	Pressure Boundary	Stainless Steel	Treated Water <140F (Internal)	Loss of Material	Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	B
Vent Header Deflector	HELB Shielding	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	A
Vent Jet Deflectors	HELB Shielding	Carbon and low alloy steel	Containment Atmosphere (External)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A4-5 (T-11)	3.5.1-21	A
Vent line bellows	Pressure Boundary	Stainless Steel (Dissimilar Metal Welds)	Containment Atmosphere (Internal)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-5 (C-22)	3.5.1-18	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-5 (C-22)	3.5.1-18	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
			Indoor Air (External)	Cracking	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-5 (C-22)	3.5.1-18	A
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-5 (C-22)	3.5.1-18	B
				Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
Vent line, and Vent Header	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A

Table 3.5.2.1.1 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Vent line, and Vent Header	Pressure Boundary	Carbon and low alloy steel	Containment Atmosphere (Internal)	Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	C
			Indoor Air (External)	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	II.B1.1-4 (C-21)	3.5.1-14	A
				Loss of Material	10 CFR Part 50, Appendix J (B.1.29)	II.B1.1-2 (C-19)	3.5.1-13	C
					ASME Section XI, Subsection IWE (B.1.27)	II.B1.1-2 (C-19)	3.5.1-13	D
					Protective Coating Monitoring and Maintenance Program (B.1.33)	II.B1.1-2 (C-19)	3.5.1-15	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The biological shield wall high density concrete is unreinforced, encased in steel plates (biological shield wall liner plate) and is inaccessible.
2. ASME Section XI, Subsection IWE and 10 CFR Part 50, Appendix J are the applicable aging management programs for Class MC pressure retaining bolting.
3. The Aging effects and Aging Management Program identified for this material/environment combination are consistent with industry guidance.
4. Loss of material due to corrosion is a TLAA for the drywell shell in Oyster Creek CLB
5. Protective coatings applied to the external surfaces of the drywell where the sand is removed (sand pocket region) has been credited for mitigating loss of material due to corrosion in CLB.
6. Concrete in contact with the embedded containment shell meets the requirements of ACI 318 and the guidance of 201.R.
7. Reduction of strength and modulus due to elevated temperature is not an aging effect requiring management. See further evaluation in Section 3.5.2.2.1.3
8. Structures Monitoring Program is the applicable aging management program for this component
9. Primary containment leakage is controlled in accordance with Oyster Creek Technical Specifications

Table 3.5.2.1.2
Reactor Building
Summary of Aging Management Evaluation

Table 3.5.2.1.2 Reactor Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Cable Tray	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Concrete Embedments	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
Conduits	Enclosure Protection	Galvanized Steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Curb	Direct Flow	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Curb	Direct Flow	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
Door	Flood Barrier	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
	HELB Shielding	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
	Leakage Boundary (Secondary Containment)	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
Equipment Foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Equipment Foundation	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
Fuel Pool Gates	Water retaining boundary	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Treated Water < 140F (External)	Loss of Material	One-Time Inspection (B.1.24)	VII.E4-4 (AP-38)	3.3.1-15	C
				Loss of Material	Water Chemistry (B.1.2)	VII.E4-4 (AP-38)	3.3.1-15	D
Fuel Pool Liner	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J-19 (AP-19)	3.3.1-78	C
			Indoor Air	None	None	VII.J-17 (AP-17)	3.3.1-76	C
			Treated Water <140F (Internal)	Cracking	Water Chemistry (B.1.2)	III.A5-13 (T-14)	3.5.1-25	B, 1
				Loss of Material	Water Chemistry (B.1.2)	III.A5-13 (T-14)	3.5.1-25	B, 1
Fuel Pool Skimmer Surge Tank Liner	Water retaining boundary	Stainless Steel	Concrete	None	None	VII.J-19 (AP-19)	3.3.1-78	C

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fuel Pool Skimmer Surge Tank Liner	Water retaining boundary	Stainless Steel	Indoor Air	None	None	VII.J-17 (AP-17)	3.3.1-76	C
			Treated Water <140F (Internal)	Loss of Material	One-Time Inspection (B.1.24)	VII.A4-11 (A-58)	3.3.1-22	C
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	D
Hatch Plugs	Shielding	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	C
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	C
						III.A2-2 (T-03)	3.5.1-21	C
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	C
	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	C
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	C
						III.A2-2 (T-03)	3.5.1-21	C

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatch Plugs	Structural Support	Concrete	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	C
Instrument Racks	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Liner (Sump)	Leakage Boundary	Carbon and low alloy steel	Concrete (External)	None	None	VII.J-24 (AP-3)	3.3.1-78	C
		Carbon and low alloy steel	Indoor Air (Internal)	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Raw Water – Fresh Water (Internal)	Loss of Material	Structures Monitoring Program (B.1.31)			G
Masonry Block Walls	Structural Support	Masonry	Indoor Air	Cracking	Masonry Wall Program (B.1.30)	III.A2-11 (T-12)	3.5.1-26	A
Metal Deck (Roof)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
Metal Siding	Enclosure Protection	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Siding	Leakage Boundary (Secondary Containment)	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
	Pressure Relief	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Miscellaneous Steel: Catwalks, Handrails, Ladders, Platforms, Grating	Structural Support	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
		Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	A
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Panels and Enclosures	Enclosure Protection	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Panels and Enclosures	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
		Stainless Steel	Indoor Air	None	None	VII.J-17 (AP-17)	3.3.1-76	C
	Structural Support	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
		Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
		Stainless Steel	Indoor Air	None	None	VII.J-17 (AP-17)	3.3.1-76	C
Penetration Seals	Flood Barrier	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 2
		Grout	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)			F
			Soil	Cracking	Structures Monitoring Program (B.1.31)			F

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetration Seals	HELB Shielding	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Grout	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)			F
		Stainless Steel	Indoor Air	None	None	VII.J-17 (AP-17)	3.3.1-76	C
	Leakage Boundary (Secondary Containment)	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Stainless Steel	Indoor Air	None	None	VII.J-17 (AP-17)	3.3.1-76	C
Pipe Whip Restraints	Pipe Whip Restraint	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
Reinforced Concrete Foundation	Structural Support	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-2 (T-03)	3.5.1-21	A
						III.A2-3 (T-08)	3.5.1-27	A
Reinforced Concrete Walls (above and below grade)	Enclosure Protection	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls (above and below grade)	Enclosure Protection	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Flood Barrier	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls (above and below grade)	Flood Barrier	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A2-2 (T-03)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Missile Barrier	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls (above and below grade)	Missile Barrier	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A2-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Shielding	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls (above and below grade)	Shielding	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
						III.A2-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls (above and below grade)	Structural Support	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
Reinforced Concrete: Beams, Columns	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
Reinforced Concrete: Walls, Slabs, Drywell Shield Wall	Enclosure Protection	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-1 (T-10)	3.5.1-29	E, 3

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete: Walls, Slabs, Drywell Shield Wall	Enclosure Protection	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Flood Barrier	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-2 (T-03)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete: Walls, Slabs, Drywell Shield Wall	Flood Barrier	Concrete	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	HELB Shielding	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Leakage Boundary (Secondary containment)	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete: Walls, Slabs, Drywell Shield Wall	Leakage Boundary (Secondary containment)	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Missile Barrier	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete: Walls, Slabs, Drywell Shield Wall	Missile Barrier	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
	Shielding	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-1 (T-10)	3.5.1-29	E, 3
						III.A2-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A2-1 (T-10)	3.5.1-29	E, 3
						III.A2-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete: Walls, Slabs, Drywell Shield Wall	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
						III.A2-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A2-3 (T-08)	3.5.1-27	A
Roofing	Enclosure Protection	Roofing Material	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)			J
Scuppers: Pipe Sleeve, Flashing, Bolts	Leakage Boundary	Aluminum	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
		Stainless Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Seals	Leakage Boundary	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 2
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 2

Table 3.5.2.1.2 Reactor Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Spray Shields	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 2
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E, 2
Structural Steel: Beams, Columns, Girders, Plates, Bracing, Trusses	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A2-12 (T-11)	3.5.1-21	A
Tube Tray	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Spent fuel pool water level is monitored in accordance with UFSAR Section 9.1 and Station Procedures.
2. Structures Monitoring Program is the applicable aging management program for seals other than fire barrier seals. Fire barrier seals are evaluated in with Auxiliary Systems, Table 3.3.2.1-15.
3. Local areas in the upper section of the Drywell Shield Wall are subject to local temperature greater than 200F Engineering analysis concluded tensile stresses are within ACI allowable limits. NRC Staff review of the analysis concluded that the drywell shield wall is capable of performing its intended function. The Staff recommended periodic monitoring of cracks in the wall to ensure continued function. Monitoring of the cracks has been included in the scope of the Structures Monitoring Program. For more details, see Section 3.5.2.2.2.1 (item 8)

Table 3.5.2.1.3
Chlorination Facility
Summary of Aging Management Evaluation

Table 3.5.2.1.3 Chlorination Facility

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Conduits	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Door	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Metal Deck	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C

Table 3.5.2.1.3 Chlorination Facility (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Siding	Enclosure Protection	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Panels and enclosures	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Stainless Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Stainless Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Reinforced concrete foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.3 Chlorination Facility (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete foundation	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
Seals	Enclosure Protection	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 1

Table 3.5.2.1.3 Chlorination Facility (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E,1
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E,1
Structural steel: Beams, Columns	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.4
Condensate Transfer Building
Summary of Aging Management Evaluation

Table 3.5.2.1.4 Condensate Transfer Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Conduits	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Door	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Equipment Foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.4 Condensate Transfer Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Deck	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Metal Siding	Enclosure Protection	Aluminum	Indoor Air	None	None	V.F-2 (EP-3)	3.2.1-32	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Panels and Enclosures	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Reinforced Concrete Foundation (includes piers)	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A

Table 3.5.2.1.4 Condensate Transfer Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Foundation (includes piers)	Structural Support	Concrete	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A

Table 3.5.2.1.4 Condensate Transfer Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Foundation (includes piers)	Structural Support	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
Seals	Enclosure Protection	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 1
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E, 1
Structural Steel: Beams, Columns	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.5
Dilution Structure
Summary of Aging Management Evaluation

Table 3.5.2.1.5 Dilution Structure

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete foundation	Structural Support	Concrete	Aggressive Environment	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
						III.A6-3 (T-17)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
			Soil	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-3 (T-17)	3.5.1-24	A
						III.A6-4 (T-08)	3.5.1-27	E, 1
			Water - flowing	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-6 (T-16)	3.5.1-24	A

Table 3.5.2.1.5 Dilution Structure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete foundation	Structural Support	Concrete	Water - flowing	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-7 (T-20)	3.5.1-24	A
Reinforced concrete Walls	Water retaining boundary	Concrete	Aggressive Environment	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
						III.A6-3 (T-17)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
			Outdoor Air	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
						III.A6-3 (T-17)	3.5.1-24	A

Table 3.5.2.1.5 Dilution Structure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls	Water retaining boundary	Concrete	Outdoor Air	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-5 (T-15)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
						III.A6-5 (T-15)	3.5.1-24	A
			Soil	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-4 (T-08)	3.5.1-27	E, 1
			Water - flowing	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-6 (T-16)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-7 (T-20)	3.5.1-24	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants is the applicable aging management program for this component.

Table 3.5.2.1.6
Emergency Diesel Generator Building
Summary of Aging Management Evaluation

Table 3.5.2.1.6 Emergency Diesel Generator Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete embedments	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Conduits	Enclosure Protection	Galvanized Steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
	Structural Support	Galvanized Steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Conduits	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Curb	Direct Flow	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
Emergency Diesel Generator Enclosure	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Emergency Diesel Generator Enclosure	Enclosure Protection	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Miscellaneous steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Panels and enclosures	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Panels and enclosures	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Reinforced concrete foundation	Structural Support	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
					Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
Reinforced concrete Walls, Slabs (Includes Removable Roof Slab)	Enclosure Protection	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs (Includes Removable Roof Slab)	Enclosure Protection	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs (Includes Removable Roof Slab)	Enclosure Protection	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
	Flood Barrier	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs (Includes Removable Roof Slab)	Flood Barrier	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
	Missile Barrier	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs (Includes Removable Roof Slab)	Missile Barrier	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.6 Emergency Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs (Includes Removable Roof Slab)	Structural Support	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
Structural Bolts	Structural Support	Alloy Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)			H, 1
Structural Steel (Plate)	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.7
Exhaust Tunnel
Summary of Aging Management Evaluation

Table 3.5.2.1.7 Exhaust Tunnel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete embedments	Structural Support	Galvanized Steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Conduits	Enclosure Protection	Galvanized Steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Curb	Direct Flow	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.7 Exhaust Tunnel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Curb	Direct Flow	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
Door	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Hatch Cover	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Masonry block walls	Enclosure Protection	Masonry	Indoor Air	Cracking	Masonry Wall Program (B.1.30)	III.A3-11 (T-12)	3.5.1-26	A
			Outdoor Air	Cracking	Masonry Wall Program (B.1.30)	III.A3-11 (T-12)	3.5.1-26	A

Table 3.5.2.1.7 Exhaust Tunnel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Panels and enclosures	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Penetration seals	Leakage Boundary	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
			Soil	Change in Material Properties	Structures Monitoring Program (B.1.31)			J
		Grout	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)			F
			Soil	Cracking	Structures Monitoring Program (B.1.31)			F
Reinforced concrete Slabs, Walls	Enclosure Protection	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.7 Exhaust Tunnel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Slabs, Walls	Enclosure Protection	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.7 Exhaust Tunnel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Slabs, Walls	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A

Table 3.5.2.1.7 Exhaust Tunnel (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Seals (Gap)	Leakage Boundary	Tar	Indoor Air	Loss of Sealing	Structures Monitoring Program (B.1.31)			J

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.8
Fire Pond Dam
Summary of Aging Management Evaluation

Table 3.5.2.1.8 Fire Pond Dam

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Pond Dam	Water retaining boundary	Various (concrete, wood, soil, rock, grout, galvanized steel)	Water - flowing, Water - standing	Loss of material, Loss of form	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-9 (T-22)	3.5.1-24	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Table 3.5.2.1.9
Fire Pumphouses
Summary of Aging Management Evaluation

Table 3.5.2.1.9 Fire Pumphouses

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Conduits	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Metal Deck	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Metal Siding	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C

Table 3.5.2.1.9 Fire Pumphouses (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Panels and Enclosures	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Reinforced Concrete Foundation	Structural Support	Concrete	Aggressive Environment	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-4 (T-05)	3.5.1-22	E, 1
						III.A3-5 (T-07)	3.5.1-22	A, 2
						III.A3-9 (T-06)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-4 (T-05)	3.5.1-22	E, 1
						III.A3-5 (T-07)	3.5.1-22	A, 2
						III.A3-9 (T-06)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-4 (T-05)	3.5.1-22	E, 1

Table 3.5.2.1.9 Fire Pumphouses (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Foundation	Structural Support	Concrete	Aggressive Environment	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-5 (T-07)	3.5.1-22	A, 2
						III.A3-9 (T-06)	3.5.1-21	A
			Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.9 Fire Pumphouses (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Foundation	Structural Support	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
			Water - Flowing	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-7 (T-02)	3.5.1-23	A
Reinforced Concrete Slab	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.9 Fire Pumphouses (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Slab	Structural Support	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
Reinforced Concrete Walls	Structural Support	Concrete	Aggressive Environment	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-4 (T-05)	3.5.1-22	E, 1
						III.A3-5 (T-07)	3.5.1-22	A, 2
						III.A3-9 (T-06)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A

Table 3.5.2.1.9 Fire Pumphouses (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls	Structural Support	Concrete	Aggressive Environment	Cracking	Structures Monitoring Program (B.1.31)	III.A3-4 (T-05)	3.5.1-22	E, 1
						III.A3-5 (T-07)	3.5.1-22	A, 2
						III.A3-9 (T-06)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-4 (T-05)	3.5.1-22	E, 1
						III.A3-5 (T-07)	3.5.1-22	A, 2
						III.A3-9 (T-06)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.9 Fire Pumphouses (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls	Structural Support	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
			Water - Flowing	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-7 (T-02)	3.5.1-23	A
Seals	Enclosure Protection	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 1
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E, 1
Structural Steel	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.
2. Below-grade concrete for the fresh water pumphouse is exposed to aggressive fresh water environment (pH = 4.8, chlorides = 12 ppm, and sulfates = 6 ppm). The Structures Monitoring program requires examination of below-grade concrete, when excavated for any reason. The program also includes provisions for sampling and testing of ground water during the period of extended operation.

Table 3.5.2.1.10
Heating Boiler House
Summary of Aging Management Evaluation

Table 3.5.2.1.10 Heating Boiler House

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Conduits	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Door	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Equipment Foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.10 Heating Boiler House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Deck	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Metal Siding	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Panels and Enclosures	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Reinforced Concrete Foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.10 Heating Boiler House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Foundation	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
					Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
					Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
					Structures Monitoring Program (B.1.31)	III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
					Structures Monitoring Program (B.1.31)	III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A

Table 3.5.2.1.10 Heating Boiler House (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Foundation	Structural Support	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
Removable Panel (in Siding)	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Seals	Enclosure Protection	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 1
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E, 1
Structural Steel: Beams, Columns, Girts, Bracing, Connection plates and angles	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.11
Intake Structure and Canal (Ultimate Heat Sink)
Summary of Aging Management Evaluation

Table 3.5.2.1.11 Intake Structure and Canal (Ultimate Heat Sink)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Conduits	Enclosure Protection	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Earthen water control structures (intake canal, embankments)	Water retaining boundary	Various (Gravel, Tar, Soil, wood, galvanized steel)	Water (flowing, standing)	Loss of Form	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-9 (T-22)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-9 (T-22)	3.5.1-24	A
Reinforced concrete foundation	Structural Support	Concrete	Aggressive Environment	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
						III.A6-3 (T-17)	3.5.1-24	A

Table 3.5.2.1.11 Intake Structure and Canal (Ultimate Heat Sink) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete foundation	Structural Support	Concrete	Aggressive Environment	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
			Outdoor Air	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
						III.A6-3 (T-17)	3.5.1-24	A
						III.A6-5 (T-15)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
						III.A6-5 (T-15)	3.5.1-24	A
			Soil	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-3 (T-17)	3.5.1-24	A

Table 3.5.2.1.11 Intake Structure and Canal (Ultimate Heat Sink) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete foundation	Structural Support	Concrete	Soil	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-4 (T-08)	3.5.1-27	E, 1
			Water - Flowing	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-6 (T-16)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-7 (T-20)	3.5.1-24	A
Reinforced concrete Slab	Structural Support	Concrete	Outdoor Air	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
						III.A6-3 (T-17)	3.5.1-24	A
						III.A6-5 (T-15)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A

Table 3.5.2.1.11 Intake Structure and Canal (Ultimate Heat Sink) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Slab	Structural Support	Concrete	Outdoor Air	Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-5 (T-15)	3.5.1-24	A
			Soil	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-4 (T-08)	3.5.1-27	E, 1
Reinforced concrete Walls	Structural Support	Concrete	Aggressive Environment	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
						III.A6-3 (T-17)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-1 (T-19)	3.5.1-24	A
			Outdoor Air	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
				Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A

Table 3.5.2.1.11 Intake Structure and Canal (Ultimate Heat Sink) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls	Structural Support	Concrete	Outdoor Air	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-3 (T-17)	3.5.1-24	A
						III.A6-5 (T-15)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-2 (T-18)	3.5.1-24	A
						III.A6-5 (T-15)	3.5.1-24	A
			Soil	Cracking	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-4 (T-08)	3.5.1-27	E, 1
			Water - Flowing	Change in Material Properties	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-6 (T-16)	3.5.1-24	A
				Loss of Material	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)	III.A6-7 (T-20)	3.5.1-24	A
Trash Racks	Filter	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
			Water - Standing	Loss of Material	Structures Monitoring Program (B.1.31)	VII.C3-10 (A-31)	3.3.1-62	E, 1

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants is the applicable aging management program for this component.

Table 3.5.2.1.12
Miscellaneous Yard Structures
Summary of Aging Management Evaluation

Table 3.5.2.1.12 Miscellaneous Yard Structures

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Embedments	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII-J-24 (AP-3)	3.3.1-78	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Conduits	Enclosure Protection	Galvanized Steel	Concrete	None	None	VII-J-24 (AP-3)	3.3.1-78	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
		Polyvinyl Chloride (PVC)	Concrete	None	None			J, 1
	Structural Support	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Curb	Flood Barrier	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Curb	Flood Barrier	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
Equipment and Component Foundations (Startup, Unit Substation, and SBO Transformers, N2 Supply, SGTS Fans and Motors, HVAC Components, etc.)	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Equipment and Component Foundations (Startup, Unit Substation, and SBO Transformers, N2 Supply, SGTS Fans and Motors, HVAC Components, etc.)	Structural Support	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A

Table 3.5.2.1.12 Miscellaneous Yard Structures

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Miscellaneous Steel (Manhole Covers)	Enclosure Protection	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Miscellaneous Steel (Platforms)	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A
Panels and Enclosures (Startup, Unit Substation, and SBO Transformers)	Enclosure Protection	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Trench, Manhole, Ductbank	Enclosure Protection	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Trench, Manhole, Ductbank	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Trench, Manhole, Ductbank	Structural Support	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
Reinforced Concrete Walls, Slabs (SWS Seal Well)	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls, Slabs (SWS Seal Well)	Structural Support	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
	Water retaining boundary	Concrete	Aggressive Environment	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-9 (T-06)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-9 (T-06)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-9 (T-06)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls, Slabs (SWS Seal Well)	Water retaining boundary	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Water - Flowing	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-7 (T-02)	3.5.1-23	E, 2
Structural Bolts	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 2
Tank Foundations (CST, Fire Water, CO2, N2, Fuel Oil)	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.12 Miscellaneous Yard Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank Foundations (CST, Fire Water, CO2, N2, Fuel Oil)	Structural Support	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
		Gravel, Sand	Soil	None	None			J
Transmission Towers	Structural Support	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Polyvinyl Chloride (PVC) has no aging effects for identified environment based on industry standards.
2. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.13
New Radwaste Building
Summary of Aging Management Evaluation

Table 3.5.2.1.13 New Radwaste Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetration Seals	Water retaining boundary	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
Reinforced concrete foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
	Water retaining boundary	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.13 New Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete foundation	Water retaining boundary	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
Reinforced concrete Walls (above and below grade)	Water retaining boundary	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.13 New Radwaste Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls (above and below grade)	Water retaining boundary	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.14
Office Building
Summary of Aging Management Evaluation

Table 3.5.2.1.14 Office Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Cable Tray	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Concrete embedments	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII.J-24 (AP-3)	3.3.1-78	C
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Conduits	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Curb	Direct Flow	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.14 Office Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Curb	Direct Flow	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
Masonry block walls	Structural Support	Masonry	Indoor Air	Cracking	Masonry Wall Program (B.1.30)	III.A3-11 (T-12)	3.5.1-26	A
Panels and enclosures	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Reinforced concrete foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.14 Office Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete foundation	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
Reinforced concrete Walls, Slabs, Beams	Enclosure Protection	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.14 Office Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs, Beams	Enclosure Protection	Concrete	Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.14 Office Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs, Beams	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Table 3.5.2.1.15
Oyster Creek Substation
Summary of Aging Management Evaluation

Table 3.5.2.1.15 Oyster Creek Substation

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Conduits	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Door	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Equipment Foundation	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.15 Oyster Creek Substation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Equipment Foundation	Structural Support	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
Metal Deck	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Metal Siding	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Reinforced Concrete Foundation	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.15 Oyster Creek Substation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Foundation	Structural Support	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
Seals	Enclosure Protection	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 1
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E, 1
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)			H, 1

Table 3.5.2.1.15 Oyster Creek Substation (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Steel	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A
Transmission Towers	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.16
Turbine Building
Summary of Aging Management Evaluation

Table 3.5.2.1.16 Turbine Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bird Screen	Enclosure Protection	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Cable Tray	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Concrete embedments	Structural Support	Carbon and low alloy steel	Concrete	None	None	VII-J-24 (AP-3)	3.3.1-78	C
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Conduits	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Equipment Foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Equipment Foundation	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
						III.A3-2 (T-03)	3.5.1-21	C
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
Hatch Plugs	Enclosure Protection	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
						III.A3-2 (T-03)	3.5.1-21	C
						III.A3-6 (T-01)	3.5.1-21	C
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
						III.A3-6 (T-01)	3.5.1-21	C
	Shielding	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatch Plugs	Shielding	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
						III.A3-2 (T-03)	3.5.1-21	C
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
						III.A3-2 (T-03)	3.5.1-21	C
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	C
Masonry block walls	Structural Support	Masonry	Indoor Air	Cracking	Masonry Wall Program (B.1.30)	III.A3-11 (T-12)	3.5.1-26	A
Metal Deck	Enclosure Protection	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Siding	Enclosure Protection	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Miscellaneous steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A
	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Panels and enclosures	Enclosure Protection	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Panels and enclosures	Structural Support	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Penetration seals	HELB Shielding	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
Reinforced concrete foundation	Structural Support	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-03)	3.5.1-21	A
						III.A3-3 (T-08)	3.5.1-27	A
Reinforced Concrete Walls (above and below grade)	Flood Barrier	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls (above and below grade)	Flood Barrier	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
	Missile Barrier	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced Concrete Walls (above and below grade)	Missile Barrier	Concrete	Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-2 (T-08)	3.5.1-27	A
	Structural Support	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-6 (T-01)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs, Beams	Flood Barrier	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
	HELB Shielding	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Walls, Slabs, Beams	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
						III.A3-2 (T-03)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A3-3 (T-08)	3.5.1-27	A
Roofing	Enclosure Protection	Roofing Material	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)			J
Seals	Enclosure Protection	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 1
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-2 (A-20)	3.3.1-46	E, 1
Structural Bolts	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-4 (AP-27)	3.3.1-35	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)	VII.I-5 (AP-26)	3.3.1-35	E, 1

Table 3.5.2.1.16 Turbine Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Bolts	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 1
				Loss Of Preload	Structures Monitoring Program (B.1.31)			H, 1
Structural steel: Beams, Columns, Girders, Plate	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A
		Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.17
Ventilation Stack
Summary of Aging Management Evaluation

Table 3.5.2.1.17 Ventilation Stack

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete embedments	Structural Support	Aluminum	Concrete	None	None			G, 1
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	C
Hatch cover	Leakage Boundary	Galvanized Steel	Indoor Air	None	None	VII.J-8 (AP-13)	3.3.1-74	C
Miscellaneous steel (catwalks, handrails, ladders, platforms, grating, and associated supports)	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5-1-21	A
Penetration seals	Leakage Boundary	Elastomer	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	VII.G-1 (A-19)	3.3.1-46	E, 2
		Grout	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)			F
			Outdoor Air	Cracking	Structures Monitoring Program (B.1.31)			F

Table 3.5.2.1.17 Ventilation Stack (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetration seals	Leakage Boundary	Grout	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)			F
Penetration sleeve, cap plates, capped auxiliary boiler exhaust pipe	Leakage Boundary	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
Reinforced concrete foundation	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A9-1 (T-03)	3.5.1-21	A
						III.A9-9 (T-04)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A9.9 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A9-1 (T-03)	3.5.1-21	A
						III.A9-2 (T-08)	3.5.1-27	A

Table 3.5.2.1.17 Ventilation Stack (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete Slabs	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A9-1 (T-03)	3.5.1-21	A
						III.A9-9 (T-04)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A9.9 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A9-2 (T-08)	3.5.1-27	A
Reinforced concrete stack (above and below grade)	Gaseous Release Path	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A9-1 (T-03)	3.5.1-21	A
						III.A9-9 (T-04)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A9-9 (T-04)	3.5.1-21	A

Table 3.5.2.1.17 Ventilation Stack (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete stack (above and below grade)	Gaseous Release Path	Concrete	Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A9-1 (T-03)	3.5.1-21	A
						III.A9-5 (T-01)	3.5.1-21	A
						III.A9-9 (T-04)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A9-5 (T-01)	3.5.1-21	A
						III.A9-9 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A9-2 (T-08)	3.5.1-27	A
	Structural Support	Concrete	Indoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A

Table 3.5.2.1.17 Ventilation Stack (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete stack (above and below grade)	Structural Support	Concrete	Indoor Air	Cracking	Structures Monitoring Program (B.1.31)	III.A9-1 (T-03)	3.5.1-21	A
						III.A9-9 (T-04)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A9-9 (T-04)	3.5.1-21	A
			Outdoor Air	Change in Material Properties	Structures Monitoring Program (B.1.31)	III.A3-10 (T-04)	3.5.1-21	A
				Cracking	Structures Monitoring Program (B.1.31)	III.A9-1 (T-03)	3.5.1-21	A
						III.A9-5 (T-01)	3.5.1-21	A
						III.A9-9 (T-04)	3.5.1-21	A
				Loss of Material	Structures Monitoring Program (B.1.31)	III.A9-5 (T-01)	3.5.1-21	A

Table 3.5.2.1.17 Ventilation Stack (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reinforced concrete stack (above and below grade)	Structural Support	Concrete	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A9-9 (T-04)	3.5.1-21	A
			Soil	Cracking	Structures Monitoring Program (B.1.31)	III.A9-2 (T-08)	3.5.1-27	A
Structural Bolts	Structural Support	Galvanized Steel	Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	VII.I-1 (AP-28)	3.3.1-36	E, 2
				Loss Of Preload	Structures Monitoring Program (B.1.31)			H, 2

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Aluminum embedded in concrete has no aging effect requiring management consistent with industry guidelines
2. Structures Monitoring Program is the applicable aging management program for this component.

Table 3.5.2.1.18
Component Supports Commodity Group
Summary of Aging Management Evaluation

Table 3.5.2.1.18 Component Supports Commodity Group

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Building concrete at locations of expansion and grouted anchors; grouted pads for support base plates	Structural Support	Concrete; grout	Containment Atmosphere	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring Program (B.1.31)	III.B1.1-1 (T-29)	3.5.1-33	A
						III.B1.2-1 (T-29)	3.5.1-33	A
						III.B2-1 (T-29)	3.5.1-33	A
						III.B5-1 (T-29)	3.5.1-33	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Building concrete at locations of expansion and grouted anchors; grouted pads for support base plates	Structural Support	Concrete; grout	Indoor Air	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring Program (B.1.31)	III.B1.1-1 (T-29)	3.5.1-33	A
						III.B1.2-1 (T-29)	3.5.1-33	A
						III.B1.3-1 (T-29)	3.5.1-33	A
						III.B2-1 (T-29)	3.5.1-33	A
						III.B3-1 (T-29)	3.5.1-33	A
						III.B5-1 (T-29)	3.5.1-33	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Building concrete at locations of expansion and grouted anchors; grouted pads for support base plates	Structural Support	Concrete; grout	Outdoor Air	Reduction in Anchor Capacity Due to Local Concrete Degradation	Structures Monitoring Program (B.1.31)	III.B1.2-1 (T-29)	3.5.1-33	A
						III.B1.3-1 (T-29)	3.5.1-33	A
						III.B2-1 (T-29)	3.5.1-33	A
						III.B3-1 (T-29)	3.5.1-33	A
						III.B5-1 (T-29)	3.5.1-33	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for ASME Class 1 Piping and Components (constant and variable load spring hangers, guides, stops, sliding surfaces, design clearances)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.1.28)	III.B1.1-2 (T-28)	3.5.1-37	I, 1
			Indoor Air	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.1.28)	III.B1.1-2 (T-28)	3.5.1-37	I, 1
Supports for ASME Class 1 Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.1-9 (T-24)	3.5.1-37	B
				None	None	III.B1.1-8 (T-26)	3.5.1-35	I, 2
			Indoor Air	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.1-9 (T-24)	3.5.1-37	B
				None	None	III.B1.1-8 (T-26)	3.5.1-35	I, 2

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for ASME Class 1 Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Galvanized Steel	Containment Atmosphere	None	None	III.B1.1-8 (T-26)	3.5.1-35	I, 2
						III.B1.2-3 (TP-8)	3.5.1-33	I, 4
			Indoor Air	None	None	III.B1.1-8 (T-26)	3.5.1-35	I, 2
						III.B1.2-3 (TP-8)	3.5.1-33	I, 4
		Stainless Steel	Containment Atmosphere	None	None	III.B1.1-6 (TP-5)	3.5.1-34	A
						III.B1.1-8 (T-26)	3.5.1-35	I, 2
			Indoor Air	None	None	III.B1.1-6 (TP-5)	3.5.1-34	A
						III.B1.1-8 (T-26)	3.5.1-35	I, 2

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for ASME Class 2 and 3 Piping and Components (constant and variable load spring hangers, guides, stops, sliding surfaces, design clearances)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.1.28)	III.B1.3-2 (T-28)	3.5.1-37	I, 1
			Indoor Air	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.1.28)	III.B1.3-2 (T-28)	3.5.1-37	I, 1
Supports for ASME Class 2 and 3 Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.2-8 (T-24)	3.5.1-37	B
				None	None	III.B1.2-7 (T-26)	3.5.1-35	I, 2
			Indoor Air	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.2-8 (T-24)	3.5.1-37	B
				None	None	III.B1.2-7 (T-26)	3.5.1-35	I, 2

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for ASME Class 2 and 3 Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Outdoor Air	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.2-8 (T-24)	3.5.1-37	B
				None	None	III.B1.2-7 (T-26)	3.5.1-35	I, 2
			Treated Water < 140F	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	VII.E4-19 (A-35)	3.3.1-15	E, 3
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	D
				None	None	III.B1.2-7 (T-26)	3.5.1-35	I, 2

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for ASME Class 2 and 3 Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Stainless Steel	Containment Atmosphere	None	None	III.B1.2-5 (TP-5)	3.5.1-34	A
						III.B1.2-7 (T-26)	3.5.1-35	I, 2
			Indoor Air	None	None	III.B1.2-5 (TP-5)	3.5.1-34	A
						III.B1.2-7 (T-26)	3.5.1-35	I, 2
			Treated Water < 140F	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	VII.A4-11 (A-58)	3.3.1-22	E, 3
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	D
				None	None	III.B1.2-7 (T-26)	3.5.1-35	I, 2

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for ASME Class MC Components (guides, stops, sliding surfaces, design clearances)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.3-2 (T-28)	3.5.1-37	I, 1
		Lubrite	Indoor Air	Loss of Mechanical Function	ASME Section XI, Subsection IWF (B.1.28)	III.B1.3-2 (T-28)	3.5.1-37	I, 1
Supports for ASME Class MC Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.3-8 (T-24)	3.5.1-37	B
			Indoor Air	Cumulative Fatigue Damage (TLAA)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	III.B1.3-7 (T-26)	3.5.1-35	A
				Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	III.B1.3-8 (T-24)	3.5.1-37	B
			Treated Water <140F	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	VII.E4-19 (A-35)	3.3.1-15	E, 3
					Water Chemistry (B.1.2)	VII.E4-19 (A-35)	3.3.1-15	D

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for ASME Class MC Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Stainless Steel	Containment Atmosphere	None	None	III.B1.2-5 (TP-5)	3.5.1-34	A
			Treated Water < 140F	Loss of Material	ASME Section XI, Subsection IWF (B.1.28)	VII.A4-11 (A-58)	3.3.1-22	E, 3
					Water Chemistry (B.1.2)	VII.A4-11 (A-58)	3.3.1-22	D
Supports for Cable Trays (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
		Galvanized Steel	Containment Atmosphere	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Indoor Air	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for conduits (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Containment Atmosphere	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Indoor Air	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for HVAC Components (vibration isolation elements)	Vibration Isolation	Elastomer	Indoor Air	Reduction or Loss of Isolation Function	Structures Monitoring Program (B.1.31)	III.B4-11 (T-31)	3.5.1-33	A
			Outdoor Air	Reduction or Loss of Isolation Function	Structures Monitoring Program (B.1.31)	III.B4-11 (T-31)	3.5.1-33	A
Supports for HVAC Components, and Other Miscellaneous Mechanical Equipment (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B5-6 (T-30)	3.5.1-33	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Indoor Air	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for HVAC ducts (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Containment Atmosphere	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Indoor Air	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for Masonry Walls (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B5-6 (T-30)	3.5.1-33	A
		Galvanized Steel	Indoor Air	None	None	III.B5-2 (TP-8)	3.5.1-33	I, 4
Supports for Non-ASME Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for Non-ASME Piping and Components (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Galvanized Steel	Containment Atmosphere	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Indoor Air	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	A
		Stainless Steel	Containment Atmosphere	None	None	III.B2-7 (TP-5)	3.5.1-34	A
			Indoor Air	None	None	III.B2-7 (TP-5)	3.5.1-34	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for Panels and Enclosures, Racks (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.B3-6 (T-30)	3.5.1-33	A
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B3-6 (T-30)	3.5.1-33	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C
		Galvanized Steel	Containment Atmosphere	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Indoor Air	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-6 (TP-6)	3.5.1-33	A

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for Platforms, Pipe Whip Restraints, Jet Impingement and Spray Shields, and Other Miscellaneous Structures (support members, welds, bolted connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.B5-6 (T-30)	3.5.1-33	A
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B5-6 (T-30)	3.5.1-33	A
			Outdoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.A3-12 (T-11)	3.5.1-21	C

Table 3.5.2.1.18 Component Supports Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for Tube Track and Instrument Tubing (support Members, Welds, Bolted Connections, support anchorage to building structure)	Structural Support	Carbon and low alloy steel	Containment Atmosphere	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
			Indoor Air	Loss of Material	Structures Monitoring Program (B.1.31)	III.B2-9 (T-30)	3.5.1-33	A
		Galvanized Steel	Containment Atmosphere	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
			Indoor Air	None	None	III.B2-4 (TP-8)	3.5.1-33	I, 4
		Stainless Steel	Containment Atmosphere	None	None	III.B2-7 (TP-5)	3.5.1-34	A
			Indoor Air	None	None	III.B2-7 (TP-5)	3.5.1-34	A

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. NUREG-1801, Line Item III.B1.1-2 (T-28), III.B1.3-2 (T-28), includes two aging effects, loss of mechanical function and elastomer hardening. Loss of mechanical function is applicable for steel materials and Oyster Creek is consistent with the NUREG for this aging effect. Elastomer hardening is not applicable because the supports do not have non-steel materials (e.g., elastomer vibration isolators).
2. Cumulative fatigue damage is not a TLAA in Oyster Creek CLB.
3. ASME Section XI, Subsection IWF is credited for confirming the effectiveness of Water Chemistry program to mitigate loss of material. SCC included in NUREG-1801, line Item III.A5-13 (T-14) is not applicable because the treated water temperature is less than 140F.
4. Galvanic corrosion occurs when two or more metals of differing electrochemical potential are in electrical contact in the presence of an electrolyte. Galvanized structural members are not combined with metals of differing electrical potential.

Table 3.5.2.1.19
Piping and Component Insulation Commodity Group
Summary of Aging Management Evaluation

Table 3.5.2.1.19 Piping and Component Insulation Commodity Group

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Insulation	Thermal Insulation	Asbestos	Containment Atmosphere (External)	None	None			J, 1, 2
			Indoor Air (External)	None	None			J, 2
		Calcium Silicate	Indoor Air (External)	None	None			J, 2
		Fiberglass	Containment Atmosphere (External)	None	None			J, 1, 2
			Indoor Air (External)	None	None			J, 2
		NUKON	Containment Atmosphere (External)	None	None			J, 1, 2
		Stainless Steel (Mirror Insulation)	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C, 1
Insulation Jacketing	Insulation Jacket Integrity	Aluminum	Indoor Air (External)	None	None	V.F-2 (EP-3)	3.2.1-32	C

Table 3.5.2.1.19 Piping and Component Insulation Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Insulation Jacketing	Insulation Jacket Integrity	Stainless Steel	Containment Atmosphere (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C
			Indoor Air (External)	None	None	VII.J-17 (AP-17)	3.3.1-76	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Insulation inside primary containment drywell was evaluated for impact on Emergency Core Cooling (ECCS) Suction Strainers in accordance with NRC Bulletin 96-03. Modifications to the strainers were implemented to accommodate the postulated debris loads, including insulation.

2. Based on plant and industry operating experience, there are no aging effects requing management for this material and environment combination.

3.6 AGING MANAGEMENT OF ELECTRICAL COMPONENTS

3.6.1 INTRODUCTION

This section provides the results of the aging management review for the electrical commodity groups identified in Section 2.5, Scoping and Screening Results: Electrical Components, as being subject to aging management review. The commodities subject to aging management review that are addressed in this section are described in the indicated sections.

- Insulated Cables and Connections (2.5.2.5.1)
- Electrical Penetrations (2.5.2.5.2)
- High Voltage Insulators (2.5.2.5.3)
- Transmission Conductors & Connections (2.5.2.5.4)
- Fuse Holders (2.5.2.5.5)
- Wooden Utility Poles (2.5.2.5.6)
- Cable Connections (Metallic Parts) (2.5.2.5.7)
- Uninsulated Ground Conductors (2.5.2.5.8)

This section also provides the results of the aging management review for the Station Blackout System described in Section 2.5.1.19.

3.6.2 RESULTS

3.6.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Management Programs For The Electrical Components

3.6.2.1.1 Insulated Cables and Connections

The insulated cables and connections commodity group was broken down for aging management review of insulation into subcategories based on their treatment in NUREG 1801:

- Insulated Cables and Connections
- Insulated Cables and Connections Used In Instrumentation Circuits
- Insulated Inaccessible Medium Voltage Cables

The types of connection insulation included in this review were splices, connectors and terminal blocks. Fuse holders are reviewed separately.

Materials

The materials of construction for the Insulated Cables and Connections are:

- Various organic polymers, e.g., XLPE, EPR, PVC, ETFE

There are no significant aging effects for inorganic materials associated with cables and they were not included in the aging management review.

Environments

Insulated Cables and Connections are exposed to the following environments:

- Adverse Localized Environment

Aging Effects Requiring Management

The following aging effects associated with Insulated Cables and Connections require management:

- Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure due to thermal/ thermoxidative degradation of organics; radiolysis and photolysis (ultraviolet [UV] sensitive materials only) of organics; radiation-induced oxidation; and moisture intrusion.
- Localized damage and breakdown of insulation leading to electrical failure / moisture intrusion, water trees

Aging Management Programs

The following aging management programs manage the aging effects for the Insulated Cables and Connections:

- 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 Used in Instrumentation Circuits
- Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of Insulated Cables and Connections.

3.6.2.1.2 <u>Electrical Penetrations</u>

Materials

The materials of construction for the Electrical Penetrations are:

- Epoxy potting
- Various organic polymers, e.g., XLPE, EPR, PVC, ETFE

Environments

The Electrical Penetrations are exposed to the following environments:

- Adverse Localized Environment
- Containment Atmosphere

Aging Effects Requiring Management

The following aging effects associated with the Electrical Penetrations require management:

- Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure due to thermal/ thermoxidative degradation of organics; radiolysis and photolysis (ultraviolet [UV] sensitive materials only) of organics; radiation-induced oxidation; and moisture intrusion - electrical cable insulation external to the penetrations only.

Aging Management Programs

The following aging management program manages the aging effects for the Electrical Penetrations:

- Electrical Cables and Connections Not Subject to 10CFR50.49 Environmental Qualification Requirements

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the Electrical Penetrations.

3.6.2.1.3 High Voltage Insulators

Materials

The materials of construction for the High Voltage Insulators are:

- Aluminum
- Cement
- Galvanized steel
- Malleable iron
- Porcelain

Environments

The High Voltage Insulators are exposed to the following environment:

- Outdoor Air

Aging Effects Requiring Management

The High Voltage Insulators have no aging effects requiring management. See Subsection 3.6.2.2.5 for additional information.

Aging Management Programs

Because there are no aging effects requiring management, no AMPs are required for the High Voltage Insulators.

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the High Voltage Insulators.

3.6.2.1.4 Transmission Conductors & Connections

Materials

The materials of construction for the Transmission Conductors & Connections are:

- Aluminum
- Steel

Environments

The Transmission Conductors & Connections are exposed to the following environment:

- Outdoor Air

Aging Effects Requiring Management

The Transmission Conductors & Connections have no aging effects requiring management. See Subsection 3.6.2.2.6 for additional information.

Aging Management Programs

Because there are no aging effects requiring management, no AMPs are required for the Transmission Conductors & Connections.

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the Transmission Conductors & Connections.

3.6.2.1.5 Fuse Holders

Materials

The materials of construction for the Fuse Holders are:

- Copper alloy (Metallic Clamps)
- Insulation materials - bakelite, phenolic, melamine or ceramic, molded polycarbonate and other

Environments

The fuse holders are exposed to the following environment:

- Indoor Air

Aging Effects Requiring Management

The Fuse Holders have no aging effects requiring management. See Subsection 3.6.2.3.1 for additional information.

Aging Management Programs

Because there are no aging effects requiring management, no AMPs are required for the Fuse Holders.

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the Fuse Holders.

3.6.2.1.6 Wooden Utility Poles

Materials

The materials of construction for the Wooden Utility Poles are:
- Treated wood

Environments

The Wooden Utility Poles are exposed to the following environments:
- Outdoor air
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Wooden Utility Poles require management:
- Change in material properties
- Loss of material

Aging Management Programs

The following aging management program manages the aging effects for the Wooden Utility Poles:
- Wooden Utility Poles Program

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the Wooden Utility Poles.

3.6.2.1.7 Cable Connections (Metallic Parts)

Materials

The materials of construction for the Cable Connections – Metallic Parts are:
- Various metals used for electrical connections

Environments

The Cable Connections – Metallic Parts are exposed to the following environment:
- Containment Atmosphere
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The Cable Connections – Metallic Parts have no aging effects requiring management. See Subsection 3.6.2.3.3 for additional information.

Aging Management Programs

Because there are no aging effects requiring management, no AMPs are required for the Cable Connections – Metallic Parts.

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the Cable Connections – Metallic Parts.

3.6.2.1.8 Uninsulated Ground Conductors

Materials

The materials of construction for the Uninsulated Ground Conductors are:
- Copper

Environments

The Uninsulated Ground Conductors are exposed to the following environment:
- Containment Atmosphere
- Indoor Air
- Outdoor Air

Aging Effects Requiring Management

The Uninsulated Ground Conductors have no aging effects requiring management. See Subsection 3.6.2.3.4 for additional information.

Aging Management Programs

Because there are no aging effects requiring management, no AMPs are required for the Uninsulated Ground Conductors.

Table 3.6.2.1.1, Electrical Commodity Groups - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the Uninsulated Ground Conductors.

3.6.2.1.9 Station Blackout System

The Station Blackout System is primarily an electrical system at Oyster Creek, and is described in Section 2.5.1.19. The electrical portions of the system are addressed as electrical commodities, in the same manner as other electrical systems. However, since the Station Blackout System at Oyster Creek also includes the Forked River Combustion Turbines power plant, this system is included here to provide a summary of the aging management review.

The Forked River Combustion Turbine power plant is owned and operated by FirstEnergy. By agreement between FirstEnergy and AmerGen, at least one of the two combustion turbines are made available if needed as an Alternate AC power source during a Station Blackout event. In accordance with the agreement, FirstEnergy maintains compliance with Appendices A and B of NRC Regulatory Guide 1.155 and Appendix B of NUMARC 87-00, which provide criteria to meet SBO requirements. FirstEnergy is responsible for performing any and all maintenance as required to maintain the reliability of the FRCTs in accordance with NRC Maintenance Rule Performance Criteria, with an aggregate Alternate AC source reliability of 0.95 (95%) per demand.

The Periodic Monitoring of Combustion Turbine Power Plant (B.2.7) aging management program is credited for aging management of the Forked River Combustion Turbines power plant. This program is a maintenance, inspection and testing program based on the Interconnection Agreement between AmerGen and FirstEnergy. The inspection, maintenance, and operational activities performed in accordance with the Interconnection Agreement provide assurance that the FRCTs will perform their intended function consistent with the current licensing basis throughout the period of extended operation.

Table 3.6.2.1.2, Station Blackout System - Summary of Aging Management Evaluation, summarizes the results of the aging management review of the Station Blackout System Forked River Combustion Turbines power plant.

3.6.2.2 AMR Results Consistent with NUREG-1801 for Which Further Evaluation is Recommended

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the LRA. For the Electrical and Instrumentation and Controls Systems commodities, those programs are addressed in the following subsections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

Electrical Equipment Subject to Environmental Qualification (EQ) is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c).

The evaluation of this TLAA is addressed in Section 4.4 of this application.

3.6.2.2.2 Not Used

3.6.2.2.3 Not Used

3.6.2.2.4 Not Used

3.6.2.2.5 Degradation of Insulator Quality due to Presence of Any Salt Deposits and Surface Contamination; and Loss of Material due to Mechanical Wear

Degradation of insulator quality due to presence of any salt deposits and surface contamination and loss of material due to mechanical wear caused by wind blowing on transmission conductors could occur in high voltage insulators. NUREG-1801 recommends further evaluation of a plant-specific aging management program to ensure that this aging effect is adequately managed.

For the reasons described below, Oyster Creek requires no aging management activities associated with salt deposits, surface contamination or wear on high voltage insulators for the extended period of operation.

Salt Deposits

Arcing leading to loss of offsite power has occurred at power plants located on sea coasts. Prevention of the problem is possible with lubricants on the insulators and may be appropriate for plants that experience the problem relatively regularly.

Weather – related occurrences of arcing due to salt deposition leading to loss of offsite power have been documented in SOER 02-1, Severe Weather, and NRC IN 93- 95, Storm - Related Loss of Offsite Power Events Due to Salt Buildup on Switchyard Insulators.

On September 18, 2003, arcing was observed on 230kV insulators in the Oyster Creek Switchyard. The arcing was not severe enough to cause ground faults. No protective relaying was actuated (CAP No. O2003-1925). The observations made in the switchyard are consistent with salt spray on the insulators. This resulted from the unusual weather conditions experienced during the passing of hurricane Isabel. The high winds and waves resulted in wind blown salty spray being deposited on the insulators. The electrical conductivity of the salty moisture on the insulators caused the observed flashing. The subsequent rains washed the salt from the insulators and eliminated the problem. Oyster Creek has not experienced any arcing leading to loss of offsite power events attributable to salt contamination.

Salt spray deposits on high voltage insulators are a temporary condition and not an aging effect, since it is external to the insulator and does not degrade the electrical or mechanical properties of the porcelain insulating material or its support structure.

Therefore, no aging management activities associated with salt deposition are required for the extended period of operation of Oyster Creek.

Contamination

Other external substances, including dust or animal contamination, could temporarily contaminate an insulator and cause an electrical path to be formed. Such deposits are a temporary condition and not an aging effect, since it is external to the insulator and does not degrade the electrical or mechanical properties of the porcelain insulating material or its support structure. The buildup of surface contamination is gradual. This contamination is washed away by rain or snow; the glazed insulator surface aids this contamination removal. Surface contamination can be a problem in areas where there are greater concentrations of airborne particles such as near facilities that discharge soot. Oyster Creek is located in an area where industrial airborne particle concentrations are comparatively low, since it is not located in a heavy industrialized area. Minor contamination is washed away by rainfall or snow, and cumulative build up has not been experienced and is not expected to occur.

Therefore, no aging management activities associated with surface contamination are required for the extended period of operation of Oyster Creek.

Wear

Mechanical wear applies to strain and suspension insulators if they are subject to significant movement. Movement of the insulators can be caused by wind blowing the supported transmission conductor, causing it to swing from side to side. If this swinging is frequent enough, it could cause wear in the metal contact points of the insulator string and between an insulator and the supporting hardware. Although this mechanism is possible, experience has shown that the transmission conductors do not normally swing significantly. When they do swing due to a substantial wind, they do not continue to swing for very long once the wind has subsided. Wind loading that can cause a transmission line and insulators to sway is considered in the design and installation. Therefore the loss of material due to wear is not considered a credible aging effect and will not cause a loss of intended function of the insulators at Oyster Creek. Therefore, loss of material due to wear is not an applicable aging effect for insulators.

Conclusion

For these reasons, no aging management activities associated with salt deposits, surface contamination or wear on high voltage insulators are required for the extended period of operation of Oyster Creek.

3.6.2.2.6 Loss of Material due to Wind Induced Abrasion and Fatigue; Loss of Conductor Strength due to Corrosion; and Increased Resistance of Connection due to Oxidation or Loss of Pre-load

Loss of material due to wind induced abrasion and fatigue; loss of conductor strength due to corrosion; and increased resistance of connection due to oxidation or loss of pre-load could occur in transmission conductors and connections; and in switchyard bus and connections. NUREG-1801 recommends further evaluation of a plant-specific aging management program to ensure that this aging effect is adequately managed.

As described in Section 2.5.2.3, OCGS has no switchyard bus or connectors in the scope of license renewal. For the reasons described below, Oyster Creek requires no aging management activities associated with loss of conductor strength or loss of preload on transmission conductors and connections for the extended period of operation.

Loss of conductor strength

EPRI 1003057, License Renewal Electrical Handbook, discusses the aging of high voltage transmission conductors and concludes that the potential aging mechanism of corrosion does not produce any significant effects that would be of a concern for their intended function. Regarding high voltage transmission conductor strength, tests performed by Ontario Hydroelectric showed a 30% loss of composite conductor strength of an 80-year-old ACSR conductor due to corrosion. Using the example of a 4/0 ACSR conductor, EPRI 1003057 shows the ultimate strength and the NESC heavy load tension requirements of 4/0 ACSR are 8350 lbs. and 2761 lbs. respectively. The margin between the NESC Heavy Load and the ultimate strength is 5589 lb.; i.e., there is a 67% of ultimate strength margin. The Ontario Hydroelectric study showed a 30% loss of composite conductor strength in an 80-year-old conductor. In the case of the 4/0 ACSR transmission conductors, a 30% loss of ultimate strength would mean that there would still be a 37% ultimate strength margin between what is required by the NESC and the actual conductor strength.

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 limited to a maximum of 60% of the ultimate conductor strength. The NESC also sets the maximum tension a conductor must be designed to withstand under various load requirements, which includes consideration of ice, wind and temperature. Therefore, for a typical transmission conductor, there is ample design margin to offset the loss of strength due to corrosion and maintain the transmission conductor intended function through the extended period of operation.

With respect to corrosion of steel core caused by loss of zinc coating or aluminum strand pitting corrosion, this is a very slow acting aging effect that is even slower for areas with less suspended particles and SO_2 concentrations in the air than in urban or industrial areas. The transmission conductors at OCGS do not see air particulates or contaminants as seen in urban or heavy industrial areas. Therefore, corrosion is not a credible aging mechanism for the intended function of OCGS transmission conductors.

EPRI 1003057 also discusses the aging of high voltage transmission conductors and concludes that the potential aging mechanism of vibration does not produce any significant effects that would be of a concern for their intended function. Regarding wind loading induced vibration, wind loading is considered in the design and installation. Aging effect of loss of material and fatigue that could be caused by transmission conductor vibration or sway are not applicable in that they would not cause a loss of intended function for the extended period of operation. Experience has shown that the transmission conductors do not normally swing significantly. When they do swing due to a substantial wind, they do not continue to swing for very long once the wind has subsided. Wind loading that can cause a transmission line to sway is considered in the design and installation. Therefore, wind loading induced vibration and fatigue are not credible aging mechanisms, and will not cause a loss of intended function of the conductors at OCGS.

Loss of preload

Preload of bolted connections is maintained by the appropriate design and the use of lock and Belleville washers that provide vibration absorption and prevent loss of preload.

A review of NRC generic communications, LERs, and NRC NUREGs related to transmission conductors identified no documents involving transmission conductors.

Conclusion

In summary, the aging mechanisms identified in NUREG 1801 item VI.A-16 are not significant for Oyster Creek transmission conductors and connections because they will not cause a loss of intended function for the extended period of operation.

3.6.2.3 AMR Results Not Consistent with NUREG-1801

3.6.2.3.1 Fuse Holders Not Part of a Larger Assembly

The only in – scope fuse holders not part of a larger assembly at Oyster Creek are the SCRAM solenoid fuse holders located in panels ER7A through ER7H that are located in the reactor building at elevation 23' 6". An evaluation of moisture, chemical contamination, oxidation and corrosion, mechanical stresses, electrical transients, thermal cycling and fatigue stressors for these fuse holders identified none that require aging management.

Moisture

As stated in DOE Cable AMG, SAND 0944, Section 3.7.2.1.3, 3% of all low-voltage metal connector failures were identified as being caused by moisture intrusion. In each case, the source of moisture was precipitation. Based on the total number of reported connector failures in the DOE Cable AMG, moisture intrusion accounted for only 10 failures in all of the operating plants in the United States. The fuse holders at OCGS that require an AMR are protected from external sources of moisture by two barriers.

The first barrier is the reactor building itself. Panels ER7A through ER7H located inside the reactor building at elevation 23'6" and do not see high relative humidity during normal conditions. These panels are not located in adverse localized areas of high temperature or humidity. These rooms are protected from weather variations and are not subject to significant temperature variations.

The second barrier is the closed panels in which the fuse holders are mounted. With regard to internal moisture (i.e., formation of condensation), a walkdown revealed no signs of moisture/humidity in the area, or any signs of moisture within the enclosures.

Chemical Contamination

The fuse holders are protected from chemical contamination by their location and design, as described above. There are no sources of chemicals in the vicinity of the fuse panels.

Oxidation and Corrosion

Fuse holders are made of copper or copper alloy plated with a corrosion resistant coating material to protect the base metal from oxidation and provide for low electrical resistance. Because they are protected as described above, the fuses holders experience no appreciable change in operating conditions, and are not exposed to a heavy industrial or oceanic environment. The fuse holders evaluated are not near any humid areas, and therefore this stressor is not applicable.

Mechanical Stresses, Electrical Transients, Thermal Cycling, Fatigue

Mechanical stresses, electrical transients, thermal cycling and fatigue do not result in aging effects requiring management for the following reasons:

- Mechanical stress due to forces associated with electrical faults and transients are mitigated by the fast action of circuit protective devices at high currents. Also, mechanical stress due to electrical faults is not considered a credible aging mechanism since such faults are infrequent and random in nature. The corrective action process is used to document adverse conditions and provides corrective actions associated with electrical fault and transients that cause the actuation of circuit protective devices.
- The Oyster Creek SCRAM discharge solenoid fuses stay energized during normal operation and do not experience frequent cycling. The loading seen by these fuses are below 60% of rated capacity. 60% loading is identified as a critical value in NUREG-1760, “Aging Assessment of safety-Related Fuses Used in Low- and Medium-Voltage Applications in Nuclear Power Plants", for fuses as generating enough heat to damage the fuse blocks and connections. The SCRAM solenoids draw only about 10.5 watts, and the fuses are rated for 3 amps. Therefore, these fuses are lightly loaded. Inspection of sample fuses did not reveal any age related degradation, and the fuse clips did not exhibit any signs of degradation.

- Vibration is induced in fuse holders by the operation of external equipment, such as compressors, fans, and pumps. Because panels ER7A through ER7H mounted on concrete walls with no attached sources of vibration, vibration is not an applicable aging mechanism.
- By design and their location, the fuse holders are not subject to aging effects associated with thermal cycling except during testing and when a scram occurs. The SCRAM solenoid fuses are continuously and lightly loaded and experience insignificant temperature rise.
- Wear and fatigue is caused by repeated insertion and removal of fuses. The SCRAM solenoid fuses are not subject to frequent manipulations. When these circuits need to be de-energized, power is removed at the safety related power supplies. When manipulated an inspection is performed which would identify any abnormal indication such as loose or corroded fuse clips. Fatigue may also be caused by frequent cycling of fuses when subject to significant loading, which could cause the clips to expand and contract and result in fatigue failure. By design, the subject fuses do not experience operational cycling during normal service and are lightly loaded. Therefore this is not an aging concern.

Conclusion

Based on the aging evaluations of the stressors identified in ISG-5, evaluations presented in NUREG-1760, and the operating service conditions of the fuses in scope of this evaluation, no stressors are identified for these fuse holders that require aging management at Oyster Creek.

3.6.2.3.2 Electrical Penetrations

Based on the evaluations performed for Oyster Creek Electrical Penetrations in accordance with the requirements of 10 CFR 50.49, there are no aging effects requiring management for the Electrical Penetrations not in scope of 10 CFR 50.49.

Applicability of Environmental Qualification Analyses to Non-EQ Penetrations

All Oyster Creek electrical penetrations are safety related and of three standard configurations. All three standard configurations are in scope of the 10 CFR 50.49 Environmental Qualification Program described in Section 4.4. Therefore, the evaluations supporting Environmental Qualification for these electrical penetrations are applicable to the electrical penetrations not part of the Environmental Qualification Program.

Evaluation Results

Aging management review of the Oyster Creek EQ penetration materials identified no aging effects requiring management based on an analysis of 60-year service environments. The electrical penetration assemblies are comprised of insulated electrical conductors and seals that provide for the passage of the conductors through a sleeve in the primary containment with the ability to provide a pressure barrier between the containment and areas outside the containment. The penetrations are pressurized with nitrogen during normal plant operation. Epoxy potting provides the sealing function, while various insulating materials provide the electrical insulation function. As demonstrated by Oyster Creek environmental qualification files, all components of the electrical penetration assemblies have been evaluated for the effects of heat, radiation, moisture and oxygen and determined to have a qualified life equal to or greater than 60 years.

Conclusion

Because the non-EQ electrical penetrations are the same as the EQ electrical penetrations, and the EQ penetrations have been shown to have a qualified life of 60 years, AmerGen concludes that the non-EQ electrical penetrations are also qualified for a 60-year life. Consequently, there are no aging effects requiring management for the non-EQ electrical penetrations at Oyster Creek.

The aging management program for Electrical Cables and Connections Not Subject To 10 CFR 50. 49 EQ Requirements (B.1.34) will be applied to cables entering electrical penetrations (pigtails) because they could experience adverse localized environments.

3.6.2.3.3 Cable Connections - Metallic Parts

An evaluation of thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion and oxidation stressors for the metallic parts of Oyster Creek electrical cable connections identified none that require aging management under this program.

Thermal Cycling, Ohmic Heating and Electrical Transients

The only metallic parts of Oyster Creek electrical cable connections that could potentially be exposed to thermal cycling and ohmic heating are those that carry significant current in power supply circuits. At Oyster Creek, power supply cables are typically installed in a continuous run from the supply, e.g., switchgear, to the load, e.g., motor. The metallic parts of connections to the supply and load are therefore part of, or internal to, active components, e.g., the switchgear and motor, and therefore not subject to aging management. Therefore, this stressor is not applicable.

Stresses due to forces associated with electrical faults and transients are mitigated by the fast action of circuit protective devices at high currents. Also, mechanical stress due to electrical faults is not considered a credible aging mechanism since such faults are infrequent and random in nature. The Oyster Creek corrective action process is used to document adverse conditions and provides corrective actions associated with electrical fault and transients that cause the actuation of circuit protective devices. Therefore, this stressor is not applicable.

Vibration

The only metallic parts of electrical cable connections exposed to vibration are those that are a part of, or internal to, active components that either cause vibration, such as motors, or are attached to mechanical systems that transmit vibration, such as valve operators or panels. Because they are parts of active components, the metallic parts of electrical cable connections exposed to vibration are not subject to aging management. Other metallic parts of electrical cable connections do not experience vibration. Therefore, this stressor is not applicable.

Chemical Contamination

At Oyster Creek, corrosive chemicals are not stored in most areas of the plant. Routine releases of corrosive chemicals to areas inside plant buildings do not occur during plant operation. Such a release, and its effects, would be an event, not an effect of aging requiring management. The Oyster Creek corrective action process would be used to document adverse conditions and provide corrective actions associated with an unintended chemical release. In addition, the metallic parts of electrical cable connections are protected from contamination by their location inside active components which are, in turn, located inside structures or covered by tape, heat shrink covering, or enclosed by an engineered splice kit. Therefore, this stressor is not applicable at Oyster Creek.

Oxidation and Corrosion

Oxidation and corrosion occur most frequently in the presence of moisture and contamination such as industrial pollutants or salt deposits. The metallic parts of Oyster Creek electrical connections are protected from moisture by several barriers. The first barrier is the active component in which the connections are mounted. The second barrier is the building in which the equipment is located. The vast majority of metallic parts of electrical connections are located inside active components that are, in turn, located in a structure with a controlled environment. Splices are protected by tape, heat shrink covering, or enclosed in an engineered splice kit. Metallic parts of electrical connections are typically made of copper or copper alloy plated with a corrosion resistant coating material to protect the base metal from oxidation and provide for low electrical resistance. Because they are protected as described above, the metallic parts of electrical connections experience no appreciable change in operating conditions, and are not exposed to a heavy industrial or oceanic environment. Therefore, this stressor is not applicable at Oyster Creek.

Conclusion

Based on the aging evaluations of the stressors identified in NUREG 1801 Section XI.E6 and the operating service conditions of the metallic parts of electrical connections in scope of this evaluation, no stressors are identified that require aging management.

3.6.2.3.4 Uninsulated Ground Conductors

The ground cable material used at Oyster Creek is copper. Copper is a good choice for this application because of its high electrical conductivity, high fusing temperature, and high corrosion resistance. Copper is also relatively strong, and it is easy to join by welding, compression, or clamping. Ground connections are commonly made with welds or mechanical type connectors, which include compression-, bolted-, and wedge-type devices.

Review of available industry technical information regarding material aging revealed that there are no aging effects requiring management for copper grounding materials. In addition, a review of industry and plant operating experiences did not identify any failures of copper ground systems due to aging effects. A complete survey of Oyster Creek grounding systems was performed in 1988 in accordance with IEEE STD. 81-1983, which showed adequate grounding existed. In addition, routine inspections of the lightning protection system have identified no degradation due to aging effects.

Therefore, based on industry and plant-specific experiences, no aging effects requiring management were identified for uninsulated ground conductors.

3.6.2.4 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Electrical Components:

- Section 4.4, Environmental Qualification

3.6.3 CONCLUSION

The Electrical Components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.4. The aging management programs selected to manage aging effects for the Electrical Components are identified in the summaries in Section 3.6.2.1 above.

A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the conclusions provided in Appendix B, the effects of aging associated with the Electrical Components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.6.1

Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-1	Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Degradation due to various aging mechanisms	Environmental qualification of electric components	Yes, TLAA	This TLAA is further evaluated in Section 4.4 and Subsection 3.6.2.2.1.
3.6.1-2	Electrical cables, connections and fuse holders (insulation) not subject to 10 CFR 50.49 EQ requirements	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure due to thermal/ thermoxidative degradation of organics; radiolysis and photolysis (ultraviolet [UV] sensitive materials only) of organics; radiation-induced oxidation; and moisture intrusion	Aging management program for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801. The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program, B.1.34, will be used to inspect cable and connection insulation to identify and assess aging effects that may be occurring due to the existence of adverse localized environments

Table 3.6.1

Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-3	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)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced IR; electrical failure due to thermal/thermoxidative degradation of organics; radiation-induced oxidation; and moisture intrusion	Aging management program for electrical cables and connections used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801. The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used In Instrumentation Circuits program, B.1.35, will be used to inspect cable and connection insulation in instrumentation circuits to identify and assess aging effects that may be occurring due to the existence of adverse localized environments
3.6.1-4	Inaccessible medium-voltage (2 kV to 15 kV) cables (e.g., installed in conduit or direct buried) not subject to 10 CFR 50.49 EQ requirements	Formation of water trees, localized damage leading to electrical failure (breakdown of insulation); water trees due to moisture intrusion	Aging management program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements	No	Consistent with NUREG-1801. The Inaccessible Medium Voltage Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements program, B.1.36, will be used to inspect inaccessible medium voltage cable and connection insulation to identify and assess aging effects that may be occurring due to the existence of adverse localized environments
3.6.1-5	PWR Only				

Table 3.6.1

Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-6	Fuse holders (metallic clamp)	Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, and oxidation	Aging management program for fuse holders	No	NUREG-1801 aging effect is not applicable to Oyster Creek. See Subsection 3.6.2.3.1 for further evaluation
3.6.1-7	Phase bus - Bus/connections	Loosening of bolted connections due to thermal cycling and ohmic heating	Aging management program for bus duct	No	Not Applicable. Oyster Creek has no phase bus in the scope of license renewal
3.6.1-8	Phase bus – Insulation/insulators	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure due to thermal/ thermoxidative degradation of organics/thermoplastics, radiation-induced oxidation; moisture/debris intrusion, and ohmic heating	Aging management program for bus duct	No	Not Applicable. Oyster Creek has no phase bus in the scope of license renewal

Table 3.6.1

Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-9	Phase bus – Enclosure assemblies	Loss of material due to general corrosion	Structures Monitoring Program	No	Not Applicable. Oyster Creek has no phase bus in the scope of license renewal
3.6.1-10	Phase bus – Enclosure assemblies	Hardening and loss of strength/ elastomers degradation	Structures Monitoring Program	No	Not Applicable. Oyster Creek has no phase bus in the scope of license renewal
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	NUREG-1801 aging effect is not applicable to Oyster Creek. See subsection 3.6.2.2.5 for further evaluation

Table 3.6.1

Summary of Aging Management Programs for the Electrical Components Evaluated in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-12	Transmission conductors and connections, Switchyard bus and connections	Loss of material due to wind induced abrasion and fatigue; Loss of conductor strength due to corrosion; Increased resistance of connection due to oxidation or loss of pre-load	Plant specific	Yes, plant specific	NUREG-1801 aging effect is not applicable to Oyster Creek transmission conductors and connections. See subsection 3.6.2.2.6 for further evaluation. Oyster Creek has no switchyard bus and connections in the scope of license renewal.
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	Aging management program for electrical cable connections not subject to 10 CFR 50.49 environmental qualification requirements	No	NUREG-1801 aging effect is not applicable to Oyster Creek. See Subsection 3.6.2.3.3 for further evaluation
3.6.1-14	Fuse Holders (Not Part of a Larger Assembly) Insulation material	None	None	N/A	Consistent with NUREG-1801

Table 3.6.2.1.1
Electrical Commodity Groups
Summary of Aging Management Evaluation

Table 3.6.2.1.1 Electrical Commodity Groups

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Cable Connections (Metallic Parts)	Electrical Continuity	Various metals used for electrical connections	Containment Atmosphere (External)	None	None	VI.A-1 (LP-12)	3.6.1-13	I, 6
			Indoor Air (External)	None	None	VI.A-1 (LP-12)	3.6.1-13	I, 6
			Outdoor Air (External)	None	None	VI.A-1 (LP-12)	3.6.1-13	I, 6
Electrical Equipment Subject To 10 CFR 50.49 EQ Requirements	Electrical continuity	Various polymeric and metallic materials	Adverse Localized Environment (Electrical Only)	Various degradation / various mechanisms	Environmental Qualification (EQ) Program (B.3.2)	VI.B-1(L-05)	3.6.1-1	A

Table 3.6.2.1.1 Electrical Commodity Groups (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Electrical penetrations	Electrical Continuity (pigtails)	Various organic polymers (e.g., EPR, XLPE, PVC, ETFE)	Adverse Localized Environment (External)	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 10CFR50.49 Environmental Qualification Requirements (B.1.34)			J, 1
	Pressure Boundary	Epoxy Potting	Containment Atmosphere (External)	None	None			J,1
Fuse Holders	Electrical Continuity	Copper alloy (Metallic Clamps)	Indoor Air (External)	None	None	VI.A-8 (LP-01)	3.6.1-6	I, 2
	Insulation - Electrical	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Adverse Localized Environment (External)	None	None	VI.A-6 (LP-03)	3.6.1-2	I, 2

Table 3.6.2.1.1 Electrical Commodity Groups (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fuse Holders	Insulation - Electrical	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Indoor Air (External)	None	None	VI.A-7 (LP-02)	3.6.1-14	A
High Voltage Insulators	Insulation - Electrical	Porcelain,Malleable iron, aluminum, galvanized steel, cement	Outdoor Air (External)	None	None	VI.A-10 (LP-11)	3.6.1-11	I, 4
						VI.A-9 (LP-07)	3.6.1-11	I, 3
Insulated cables and connections	Electrical Continuity	Various organic polymers (e.g., EPR, XLPE, PVC, ETFE)	Adverse Localized Environment (External)	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 10CFR50.49 Environmental Qualification Requirements (B.1.34)	VI.A-2 (L-01)	3.6.1-2	A

Table 3.6.2.1.1 Electrical Commodity Groups (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Insulated cables and connections in instrumentation circuits	Electrical Continuity	Various organic polymers (e.g., EPR, XLPE, PVC, ETFE)	Adverse Localized Environment (External)	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 10CFR50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B.1.35)	VI.A-3 (L-02)	3.6.1-3	A
Insulated inaccessible medium-voltage cables	Electrical Continuity	Various organic polymers (e.g., EPR, XLPE, PVC, ETFE)	Adverse Localized Environment (External)	Localized damage and breakdown of insulation leading to electrical failure/ moisture intrusion, water trees	Inaccessible Medium Voltage Cables Not Subject to 10CFR50.49 Environmental Qualification Requirements.(B.1.36)	VI.A-4 (L-03)	3.6.1-4	A
Transmission conductors and connections	Electrical Continuity	Aluminum, steel	Outdoor Air (External)	None	None	VI.A-16 (LP-08)	3.6.1-12	I, 5
Uninsulated Ground Conductors	Electrical Continuity	Copper	Containment Atmosphere (External)	None	None			J, 7
			Indoor Air (External)	None	None			J, 7

Table 3.6.2.1.1 Electrical Commodity Groups (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Uninsulated Ground Conductors	Electrical Continuity	Copper	Outdoor Air (External)	None	None			J, 7
Wooden Utility Poles	Structural Support	Treated Wood	Outdoor Air (External)	Change in Material Properties	Wooden Utility Poles (B.2.6)			J
				Loss of Material	Wooden Utility Poles (B.2.6)			J
			Soil (External)	Change in Material Properties	Wooden Utility Poles (B.2.6)			J
				Loss of Material	Wooden Utility Poles (B.2.6)			J

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. Insulation internal to Oyster Creek electrical penetrations and epoxy potting sealing material have a service life in excess of 60 years. Pigtails are included in the scope of the Electrical Cables and Connections Not Subject to 10CFR50.49 Environmental Qualification Requirements Aging Management Program. See Subsection 3.6.2.3.2 for additional information.
2. Oyster Creek fuse holders (not part of a larger assembly) do not experience the aging effects identified in NUREG-1801 due to their location and environment. See Subsection 3.6.2.3.1 for additional information.
3. Oyster Creek high voltage insulators do not experience degradation of insulator quality due to the presence of salt deposits and surface contamination identified in NUREG-1801. See subsection 3.6.2.2.5 for further information.
4. Oyster Creek high voltage insulators do not experience the mechanical wear identified in NUREG-1801. See subsection 3.6.2.2.5 for additional information.
5. Oyster Creek transmission conductors and connections do not experience the aging effects identified in NUREG-1801. See subsection 3.6.2.2.6 for additional information.
6. Oyster Creek electrical cable connections (metallic parts) do not experience the aging effects identified in NUREG 1801. See subsection 3.6.2.3.3 for additional information.
7. Oyster Creek uninsulated ground conductors do not experience aging effects requiring management. See subsection 3.6.2.3.4 for additional

information.

Table 3.6.2.1.2
Station Blackout System
Summary of Aging Management Evaluation

Table 3.6.2.1.2 Station Blackout System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Combustion Turbine Power Plant	See Section 2.5.1.19	Note 1	Note 1	Note 1	Periodic Monitoring of Combustion Turbine Power Plant (B.2.7)			1

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. The Forked River Combustion Turbine power plant is owned and operated by FirstEnergy. By agreement between FirstEnergy and AmerGen, at least one of the two combustion turbines are made available as an Alternate AC power source during a Station Blackout event. In accordance with the agreement, FirstEnergy maintains compliance with Appendices A and B of NRC Regulatory Guide 1.155 and Appendix B of NUMARC 87-00, which provide criteria to meet SBO requirements. FirstEnergy is responsible for performing any and all maintenance as required to maintain the reliability of the FRCTs in accordance with NRC Maintenance Rule Performance Criteria, with an aggregate Alternate AC source reliability of 0.95 (95%) per demand. Electrical components associated with the Station Blackout System are included with other electrical commodities in Table 3.6.2.1.1.

4.0 TIME-LIMITED AGING ANALYSES

4.1 INTRODUCTION

This section presents descriptions of the Time-Limited Aging Analyses (TLAAs) for Oyster Creek in accordance with 10 CFR 54.3(a) and 10 CFR 54.21(c). The section is divided into sections, each containing a number of TLAAs in a common general category:

- Neutron Embrittlement of the Reactor Vessel and Internals
- Metal Fatigue of the Reactor Vessel, Internals, and Primary Coolant Boundary Piping and Components
- Environmental Qualification of Electrical Equipment (EQ)
- Loss of Prestress in Concrete Containment Tendons
- Fatigue of the Primary Containment, Attached Piping, and Components
- Other Plant-Specific TLAAs information about the TLAAs in a general category is presented within each section, as follows:

Summary Description:	A brief description of the TLAA topic is provided.
Analysis:	A description of the current license analysis is provided.
Disposition:	The disposition is provided and classified in accordance with 10 CFR 54.21(c)(1) as: ▪ Validation, ▪ Revision, or ▪ Aging Management

NUREG-1801 identifies numerous aging effects that may have associated analyses, which require evaluation as possible TLAAs in accordance with 10 CFR 54.21(c). Each of these is summarized in NUREG-1800 and presented in Section 3 of this LRA and referenced to the appropriate TLAA section.

4.1.1 IDENTIFICATION OF TLAAS

The scope and methods for identifying TLAAs are consistent with the NUREG-1800 Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants. (SRP)

Under the 10 CFR 54 License Renewal Rule (the Rule), an analysis, calculation, or evaluation is a “Time-Limited Aging Analysis” (TLAA) only if it meets all six of the defining criteria per 10 CFR 54.3(a). These are:

1. Involve systems, structures, and components within the scope of license renewal,
2. Consider the effects of aging;
3. Involve time-limited assumptions defined by the current operating term, for example, 40 years;
4. Were determined to be relevant by the licensee in making a safety determination;
5. Involve conclusions or provide the basis for conclusions related to the capability of the system, structure, and component to perform its intended functions, and
6. Are contained or incorporated by reference in the CLB (current licensing basis).

A list of potential generic TLAAs was assembled from the SRP, industry guidance and experience, including:

- NUREG-1800, Standard Review Plan for License Renewal
- NUREG-1801, The Generic Aging Lessons Learned (GALL) report
- NEI 95-10, Industry Guideline for Implementing the Requirements of 10 CFR 54 the License Renewal Rule
- The 10 CFR 54 Final Rule “Statement of Considerations,” and
- Prior license renewal applications.

The Oyster Creek current licensing basis (CLB) was searched to confirm the occurrence of plant-specific TLAAs and to identify additional plant-specific TLAAs. The CLB search included the following documents:

- Updated Final Safety Analysis Report (UFSAR)
- Operating License and License Conditions
- Technical Specifications
- Safety Evaluation Reports (SERs)
- Oyster Creek and NRC Licensing Correspondence
- The Containment Plant Unique Analysis Report (PUAR)
- Licensing basis program documents, such as the ISI and EQ.

The resulting list of potential TLAAs was reviewed (screened) against the six 10 CFR 54.3(a) criteria with the aid of supporting documents, such as:

- Environmental Qualification Binders
- ISI reports (ASME XI Summaries of Reportable Indications)
- Design Basis Documents
- Drawings
- Specifications
- Calculations
- Containment Plant Unique Analysis Report (PUAR)
- Procedures

The supporting sources confirmed the screening and provided the information needed for dispositions.

The Rule requires that these TLAAs be evaluated 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 function(s) will be adequately managed for the period of extended operation.

Each TLAA was dispositioned by one of these three methods.

4.1.2 IDENTIFICATION OF EXEMPTIONS

The rule requires a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and is based on time-limited aging analyses as defined in §54.3.

A search of docketed correspondence, the operating license, and the Updated Final Safety Analysis Report (UFSAR) was made to identify all exemptions in effect. Each exemption in effect was evaluated to determine if it involved a TLAA as defined in 10 CFR 54.3. There are no exemptions based on time-limited aging analyses in effect.

4.1.3 SUMMARY OF RESULTS

Six general categories of TLAAs applicable to Oyster Creek were identified in Sections 4.2 through 4.7 of this section, with their dispositions. A summary is presented in Table 4.1-1. The table includes a reference to the applicable section of this report that discusses the TLAA.

Table 4.1-1
Time-Limited Aging Analyses Applicable to Oyster Creek

TLAA Category	Description	Disposition Category	Section
1.	**Neutron Embrittlement of the Reactor Vessel and Internals**		4.2
	Reactor Vessel Materials Upper-Shelf Energy Reduction Due to Neutron Embrittlement	§54.21(c)(1)(ii)	4.2.1
	Adjusted Reference Temperature for Reactor Vessel Materials Due to Neutron Embrittlement	§54.21(c)(1)(ii)	4.2.2
	Reactor Vessel Thermal Limit Analyses: Operating Pressure – Temperature Limits	§54.21(c)(1)(ii)	4.2.3
	Reactor Vessel Circumferential Weld Examination Relief	§54.21(c)(1)(ii)	4.2.4
	Reactor Vessel Axial Weld Examination Relief	§54.21(c)(1)(ii)	4.2.5
	Core Reflood Thermal Shock Analysis	Not Applicable	4.2.6
	Reactor Internals Components	§54.21(c)(1)(iii)	4.2.7
2.	**Metal Fatigue of the Reactor Vessel, Internals, and Reactor Coolant Pressure Boundary Piping and Components**		4.3
	Reactor Vessel Fatigue Analyses	§54.21(c)(1)(iii)	4.3.1
	Fatigue Analysis of Reactor Vessel Internals		4.3.2
	Low-Cycle Thermal and Flow-Induced Vibration Fatigue Analysis of the Core Shroud and Repair Hardware	§54.21(c)(1)(i)	4.3.2.1
	Reactor Coolant Pressure Boundary Piping and Component Fatigue Analysis		4.3.3
	Reactor Coolant Pressure Boundary Piping and Components	§54.21(c)(1)(i)	4.3.3.1
	Fatigue Analysis of the Isolation Condenser	§54.21(c)(1)(i)	4.3.3.2
	Effects of Reactor Coolant Environment on fatigue life of components and piping (GS-190)	§54.21(c)(1)(ii) and §54.21(c)(1)(iii)	4.3.4
3.	**Environmental Qualification of Electrical Equipment (EQ)**		
	Electrical Equipment EQ	§54.21(c)(1)(iii)	4.4
4.	**Loss of Prestress in Concrete Containment Tendon**	Not Applicable	4.5
5.	**Fatigue Analysis of Primary Containment, Attached Piping, and Components**		4.6
	Fatigue Analysis of the Primary Containment System (Includes Suppression Chamber, Vents, VENT HEADERS, and Downcomers, EMRV Discharge Piping Inside the Suppression Chamber, External Suppression Chamber Attached Piping, Associated Penetrations, and Drywell-to-Suppression Chamber Vent Line Bellows)	§54.21(c)(1)(i) and §54.21(c)(1)(iii)	4.6.1
	Primary Containment Process Penetration & Bellow Fatigue Analysis	§54.21(c)(1)(i) and §54.21(c)(1)(iii)	4.6.2
6.	**Other Plant-Specific TLAAs**		4.7
	Reactor Building Crane, Turbine Building Crane, Heater Bay Crane Load Cycles	§54.21(c)(1)(ii)	4.7.1
	Drywell Corrosion	§54.21(c)(1)(iii)	4.7.2
	Equipment Pool and Reactor Cavity Walls Rebar Corrosion	§54.21(c)(1)(ii)	4.7.3
	Reactor Vessel Weld Flaw Evaluations	§54.21(c)(1)(ii)	4.7.4
	CRD Stub Tube Flaw Analysis	§54.21(c)(1)(i)	4.7.5

4.2 NEUTRON EMBRITTLEMENT OF THE REACTOR VESSEL AND INTERNALS

The ferritic materials of the reactor vessel are subject to embrittlement due to high energy neutron exposure. Embrittlement means the material has lower toughness (e.g. will absorb less strain energy during a crack or rupture), thus allowing a crack to propagate more easily under load.

Toughness (indirectly measured in foot-pounds of absorbed energy in a Charpy impact test) is temperature dependent. In most materials, toughness increases with temperature up to a maximum value called the “upper-shelf energy,” or USE. Neutron embrittlement results in a decrease to the USE of reactor vessel steels. To reduce the potential for brittle fracture during vessel operation changes in material toughness as a function of neutron radiation exposure (fluence) are accounted for by operating pressure-temperature limit curves (P-T curves) that are included in plant Technical Specifications. The P-T curves account for the decrease in material toughness associated with a given fluence in the future. The fluence is used to predict the loss in toughness of the reactor vessel materials. Based on the projected drop in toughness for a given fluence, the P-T curves are generated to provide a minimum temperature limit to which the vessel can be pressurized.

An initial nil-ductility reference temperature (RT_{NDT}) is determined for vessel materials before exposure to neutron radiation raises this transition temperature. This increase or shift in the initial nil-ductility reference temperature (ΔRT_{NDT}) means higher temperatures are required for the material to continue to act in a ductile manner. The P-T curves are determined using the RT_{NDT} and ΔRT_{NDT} values for the licensed operating period along with appropriate margins.

The reactor vessel material ΔRT_{NDT} and USE values, calculated on the basis of neutron fluence, are part of the licensing basis, and support safety determinations. Therefore, these calculations are TLAAs. The increases in RT_{NDT} (ΔRT_{NDT}) affect the bases for relief from circumferential weld inspection and its associated supporting calculation of limiting axial weld conditional failure probability. As such, circumferential weld examination relief and axial weld failure probability are also TLAAs. Section 4.2 includes the following TLAA discussions related to the issue of neutron embrittlement:

- Reactor Vessel Materials Upper-Shelf Energy Reduction Due to Neutron Embrittlement
- Adjusted Reference Temperature (ART) for Reactor Vessel Materials Due to Neutron Embrittlement
- Reactor Vessel Thermal Limit Analyses: Operating Pressure – Temperature Limits
- Reactor Vessel Circumferential Weld Examination Relief
- Reactor Vessel Axial Weld Examination Relief
- Reflood Thermal Shock

- Reactor Internals Components

The chemistry data used for the supporting Oyster Creek materials evaluations (e.g., USE, ART, circumferential weld examination relief, and axial weld failure probability) reported in the TLAA discussions in Section 4.2 are taken from the recommended values in Reference 4.8.6. Reference 4.8.6 reports the results of a recent systematic review and analysis of the metallurgical data available for the Oyster Creek reactor vessel weld, plate, and forging materials. Included in Reference 4.8.6 are recommendations for the best data to be used for materials evaluations. Most of this information has been previously formally transmitted to the NRC (e.g., see References 4.8.21 and 4.8.22). However, a review of the NRC Reactor Vessel Integrity Database (RVID2) indicates that not all of the recommended values documented in Reference 4.8.6 are reflected in RVID2. The TLAA analyses reported in Section 4.2 are based on the data provided in Reference 4.8.6, which is the best estimate of the chemistry data for the Oyster Creek reactor vessel.

<u>Neutron Fluence Analysis</u>

The maximum core average exposure projected from the current value to the end of the period of extended operation (60 years) is less than 50 effective full power years (EFPY). This value was obtained by assuming operation at 100% power from the current cycle to the end of the period of extended operation. Since a 100% capacity factor cannot be achieved, Oyster Creek is likely not to exceed 48 EFPY by the end of the period of extended operation. Therefore 50 EFPY bounds the actual exposure that will be accrued over the 60-year life of the plant.

Fluence was calculated for the Oyster Creek reactor vessel for the extended 60-year (50 EFPY) licensed operating period, using the methodology of the RAMA Fluence Methodology software package (Reference 4.8.1). The RAMA methodology was developed by EPRI and complies with the requirements of REG Guide 1.190. The NRC has reviewed RAMA and has issued a SER. Oyster Creek will comply with the conditions of the SER. As part of the fluence analysis for the reactor pressure vessel (RPV), results of the of fluence measurements from one surveillance specimen and six special capsules performed as part of BWRVIP Supplemental Surveillance Program were evaluated to develop a plant specific uncertainty analysis for the application of RAMA to Oyster Creek (Reference 4.8.1). The uncertainty analysis demonstrates compliance to the requirements of Regulatory Guide 1.190.

4.2.1 REACTOR VESSEL MATERIALS UPPER-SHELF ENERGY REDUCTION DUE TO NEUTRON EMBRITTLEMENT

Summary Description

Upper shelf energy (USE) is the standard industry parameter used to indicate the maximum toughness of a material at high temperature. 10 CFR 50 Appendix G requires the predicted end-of-life Charpy impact test USE for reactor vessel materials to be at least 50 ft-lb (absorbed energy), unless an approved analysis supports a lower value. Initial unirradiated test data are not available for the Oyster Creek reactor vessel to demonstrate a minimum 50 ft-lb USE by standard methods. End-of-life fracture energy was evaluated by using an equivalent margin analysis (EMA) methodology approved by the NRC in NEDO-32205-A. This analysis confirmed that an adequate margin of safety against fracture, equivalent to 10 CFR 50 Appendix G requirements, does exist.

The end-of-life upper shelf energy calculations satisfy the criteria of 10 CFR 54.3(a). As such, these calculations are a TLAA.

Analysis

The Oyster Creek reactor vessel was designed for a 40-year life with an assumed neutron exposure of less than 10^{19} n/cm^2 from energies exceeding 1 MeV. The current licensing basis calculations use realistic calculated fluence values that are lower than this value. The design basis value of 10^{19} n/cm^2 bounds calculated fluence for the original 40-year term.

The tests performed on reactor vessel materials under the Code of record provided limited Charpy impact data. It was not possible to develop original Charpy impact test USE values using the ASME III NB-2300, Summer 1972 (and later) methods invoked by 10 CFR 50 Appendix G. Therefore, alternative methods approved by the NRC in NEDO-32205-A, were used to demonstrate compliance with the 40-year 50 ft-lb USE requirement.

Disposition: Revision, 10 CFR 54.21(c)(1)(ii)

Peak fluence was calculated at the vessel inner surface (inner diameter), for purposes of evaluating USE. The value of neutron fluence was also calculated for the 1/4T location into the vessel wall base material measured radially from the inside diameter (ID) at the clad-base metal interface, using Equation 3 from Paragraph 1.1 of Regulatory Guide 1.99, Revision 2. The maximum 1/4T fluence value calculated for Oyster Creek at 50 EFPY is 4.39 $\times 10^{18}$ n/cm^2 in the lower intermediate shell. This 1/4T depth is recommended in the ASME Boiler and Pressure Vessel Code Section XI, Appendix G, 1998 Edition, Addendum 2000, Sub-article G-2120 as the maximum postulated defect depth. The 1/4T fluence is provided in Tables 4.2.1-1, 4.2.1-2, and 4.2.1-3.

The 60-year USE was evaluated by an equivalent margin analysis (EMA) using the 50 EFPY calculated fluence and Oyster Creek surveillance capsule results. Valid data is available for only one surveillance capsule. EPRI TR-113596, “BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines,” BWRVIP-74-A, June 2003 (Reference 4.8.25), performs a generic analysis and determines that the percent reduction in Charpy USE for the limiting BWR/2 plates and BWR/2-6 welds are 29.5 per cent and 39 per cent, respectively. Summary Tables 4.2.1-1 through 4.2.1-3 provide results of the equivalent margin analysis for limiting welds and plates on the Oyster Creek reactor vessel. The results show that the limiting USE EMA percent is less than the BWRVIP-74 EMA percent acceptance criterion in all cases. Further, a plant specific EMA is therefore not required.

Table 4.2.1-1
Equivalent Margin Analysis for Oyster Creek Lower Intermediate Plate Material

BWR/2 PLATE

Surveillance Plate USE:

%Cu =	0.17	
Capsule Fluence =	0.746×10^{18} n/cm^2	
Measured % Decrease =	0.6	(Charpy Curves)
R.G. 1.99 Predicted % Decrease =	14	(R.G. 1.99, Figure 2)

Lower Intermediate Beltline Plate (564-03A, B, C) USE:

%Cu =	0.21	
50 EFPY 1/4T Fluence =	4.39×10^{18} n/cm^2	
R.G. 1.99 Predicted % Decrease =	28	(R.G. 1.99, Figure 2)
Adjusted % Decrease =	N/A	(R.G. 1.99, Position 2.2)

28% ≤ 29.5%, so vessel lower intermediate plates are bounded by equivalent margin analysis.

Table 4.2.1-2
Equivalent Margin Analysis for Oyster Creek Lower Vessel Plate Material

BWR/2 PLATE

Surveillance Plate USE:

%Cu	=	0.17	
Capsule Fluence	=	0.746×10^{18} n/cm^2	
Measured % Decrease	=	0.6	(Charpy Curves)
R.G. 1.99 Predicted % Decrease	=	14	(R.G. 1.99, Figure 2)

Lower Beltline Plate (564-03D, E, F) USE:

%Cu	=	0.27	
50 EFPY 1/4T Fluence	=	2.37×10^{18} n/cm^2	
R.G. 1.99 Predicted % Decrease	=	29	(R.G. 1.99, Figure 2)
Adjusted % Decrease	=	N/A	(R.G. 1.99, Position 2.2)

29% ≤ 29.5%, so vessel lower plates are bounded by equivalent margin analysis.

Table 4.2.1-3
Equivalent Margin Analysis for Oyster Creek Weld Material

BWR/2 WELD

Surveillance Weld USE:

%Cu	=	0.28	
Capsule Fluence	=	0.746×10^{18} n/cm^2	
Measured % Decrease	=	not reported	(Charpy Curves)
R.G. 1.99 Predicted % Decrease	=	not reported	(R.G. 1.99, Figure 2)

Limiting Beltline Weld (86054B & 1248) USE:

%Cu	=	0.21	
50 EFPY 1/4T Fluence	=	3.88×10^{18} n/cm^2	
R.G. 1.99 Predicted % Decrease	=	32	(R.G. 1.99, Figure 2)
Adjusted % Decrease	=	N/A	(R.G. 1.99, Position 2.2)

32% ≤ 39%, so vessel welds are bounded by equivalent margin analysis.

4.2.2 ADJUSTED REFERENCE TEMPERATURE FOR REACTOR VESSEL MATERIALS DUE TO NEUTRON EMBRITTLEMENT

Summary Description

The initial nil-ductility reference temperature, RT_{NDT}, is the temperature at which a non-irradiated metal (ferritic steel) changes in fracture characteristics going from ductile to brittle behavior. RT_{NDT} is evaluated according to the procedures in the ASME Code, Paragraph NB-2331. Neutron embrittlement raises the initial RT_{NDT}. 10 CFR 50 Appendix G defines the fracture toughness requirements for the life of the vessel. The shift to the initial RT_{NDT} (ΔRT_{NDT}) is evaluated as the difference in the 30 ft-lb index temperatures from the average Charpy curves measured before and after irradiation. This increase (ΔRT_{NDT}) means that higher temperatures are required for the material to continue to act in a ductile manner. The adjusted reference temperature (ART) is defined as RT_{NDT} + ΔRT_{NDT} + Margin. The Margin term is defined in Regulatory Guide 1.99, Revision 2. The P-T curves are developed from limiting ART values for the vessel materials. The ART values are determined by the unirradiated RT_{NDT} and the ΔRT_{NDT} calculations for the licensed operating period. Regulatory Guide 1.99, Revision 2 defines the calculation methods for ΔRT_{NDT}, ART, and end-of-life USE.

The ΔRT_{NDT} and ART calculations meet the criteria of 10 CFR 54.3(a). As such, they are TLAAs.

Analysis

The Oyster Creek reactor vessel was designed for a 40-year life with an assumed neutron exposure of less than 10^{19} n/cm^2 from energies exceeding 1 MeV (Reference 4.8.2). The current licensing basis calculations use realistic calculated fluence values that are lower than this value. The design basis value of 10^{19} n/cm^2 bounds calculated fluence for the original 40-year term. The ΔRT_{NDT} values were determined using the embrittlement correlations defined in Regulatory Guide 1.99, Revision 2.

Disposition: Revision, 10 CFR 54.21(c)(1)(ii)

50 EFPY fluence values were calculated for the Oyster Creek reactor vessel for the extended 60-year licensed operating period, using the methodology of the RAMA Fluence Methodology software package (Reference 4.8.1). Peak fluence was calculated at the vessel inner surface (inner diameter) for purposes of evaluating ART. The value of neutron fluence was also calculated for the 1/4T location into the vessel wall base material measured radially from the inside diameter (ID) at the clad-base metal interface, using Equation 3 from Paragraph 1.1 of Regulatory Guide 1.99, Revision 2. This 1/4T depth is recommended in the ASME Boiler and Pressure Vessel Code Section XI, Appendix G, 1998 Edition, Addendum 2000, Sub-article G-2120 as the maximum postulated defect depth.

The 50 EFPY ΔRT_{NDT} values for all beltline materials were calculated based on the embrittlement correlation found in Regulatory Guide 1.99, Revision 2. The peak fluence, ΔRT_{NDT}, and ART values for the 60-year (50 EFPY) licensed operating period are presented in Table 4.2.2-1. This table shows that the limiting 50 EFPY ART value is not unreasonably high, and the value will allow P-T limits to be developed that will provide reasonable operational flexibility.

Oyster Creek will manage the 50 EFPY ΔRT_{NDT} and ART values in conjunction with the surveillance capsule results from the BWRVIP Integrated Surveillance Program (BWRVIP Reports -78 and -86). See the Reactor Vessel Surveillance Program (B.1.23) for additional details.

As shown in Table 4.2.2-1 ΔRT_{NDT} and ART values are provided for the beltline materials. Also shown are 50 EFPY fluence values at the inner surface and 1/4T depth, as well as plate and weld specific chemistry information. The material with the limiting ART value occurs in the reactor vessel lower intermediate shell plate material.

Table 4.2.2-1
50 EFPY Adjusted Reference Temperatures for Oyster Creek Reactor Vessel Materials

PART NAME	PIECE NO.	CODE NO.	INITIAL RT_{NDT} ºF	CHEMISTRY			FLUENCE		ADJUSTMENTS FOR MARGIN AND BELTLINE IRRADIATION SHIFT				
				Cu %	Ni %	CF ºF	RPV ID Fluence 10^{19} n/cm^2	RPV 1/4T Fluence 10^{19} n/cm^2	ΔRT_{NDT} ºF	σ_{Δ} ºF	σ_{I} ºF	Margin ºF	ART ºF
Lower Intermediate Shell **(Beltline)**	564-03A	G-8-7	15	0.21	0.48	139.4	0.697	0.439	107.5	17	17	48	170.6
	564-03B	G-8-8	20	0.18	0.46	120.7	0.697	0.439	93.1	17	17	48	161.2
	564-03C	G-8-6	32	0.2	0.51	138.2	0.697	0.439	106.6	17	17	48	186.7
Lower Shell **(Beltline)**	564-03D	G-307-1	35	0.17	0.11	79.5	0.376	0.237	48.5	17	17	48	131.6
	564-03E	G-308-1	28	0.17	0.11	79.5	0.376	0.237	48.5	17	17	48	124.6
	564-03F	G-307-5	2	0.27	0.53	173.9	0.376	0.237	106.2	17	17	48	156.3
2-564A, B and C, Lower Intermediate Shell (**Beltline)**	RACO 3 wire	86054B	-50	0.21	0.05	96	0.616	0.388	70.8	28	0	56	76.8
	(Two wire Heats)	1248	-50	0.21	0.07	98	0.616	0.388	72.3	28	0	56	78.3
2-564D, E, and F Lower Shell **(Beltline)**	RACO 3 wire	86054B	-8	0.21	0.05	96	0.371	0.234	58.3	28	0	56	106.3
3-564 Lower Intermediate Shell to Lower Shell (**Beltline)**	RACO 3 wire	1248	-50	0.21	0.07	98	0.376	0.237	59.8	28	0	56	65.8

CF = Chemistry factor defined in Reg. Guide 1.99

σ_{Δ}, σ_{I} = Margin terms defined in Reg. Guide 1.99

4.2.3 REACTOR VESSEL THERMAL LIMIT ANALYSES: OPERATING PRESSURE – TEMPERATURE LIMITS

Summary Description

The Adjusted Reference Temperature (ART) is a key material property for developing operating pressure-temperature (P-T) limits, and is used to establish the minimum temperature at which the reactor vessel is allowed to be pressurized. ART is the value of Initial RT_{NDT} + ΔRT_{NDT} + Margin for uncertainties at a specific reactor vessel location and material. Neutron embrittlement increases the ART. Thus, the minimum temperature at which the reactor vessel is allowed to be pressurized increases with increased fluence. The ART of the limiting beltline material is used to adjust the beltline P-T limits to account for irradiation effects.

10 CFR Part 50 Appendix G requires reactor vessel thermal limit analyses to determine operating P-T limits for boltup, hydrotest, pressure tests and normal operating and anticipated operational occurrences. Operating limits for pressure and temperature are required for three categories of operation: 1) hydrostatic pressure tests and leak tests, referred to as Curve A; 2) non-nuclear heat-up / cooldown and low-level physics tests, referred to as Curve B; and 3) core critical operation, referred to as Curve C. P-T limits are developed for three bounding vessel regions: the upper vessel region (non-beltline, including the head flange region), the core beltline region, and the vessel bottom head region.

The calculations associated with generation of the P-T curves satisfy the criteria of 10 CFR 54.3(a). As such, this topic is a TLAA.

Analysis

The Oyster Creek Technical Specifications contain P-T limit curves for heat-up, cooldown, and in-service leakage and hydrostatic testing, and also limit the maximum rate of change of reactor coolant temperature. The criticality curves provide limits for both heat-up and criticality calculated for 32 EFPY operating period. Because of the relationship between the P-T limits and the fracture toughness transition of the Oyster Creek reactor vessel, new P-T limits are required to be calculated and approved before the extended period of operation. Revised P-T limits have been completed for Oyster Creek utilizing updated fluence calculations for the extended operating period and demonstrate acceptable operating conditions. These will be submitted to NRC for approval prior to the period of extended operation.

Disposition: Revision, 10 CFR 54.21(c)(1)(ii)

Revised P-T limits using an approved fluence methodology have been performed for Oyster Creek using 50 EFPY fluence values valid for the period of extended operation (60 years). These curves will be submitted to the NRC for approval prior to the start of the extended period of operation. Oyster Creek will manage the P-T curves using approved fluence calculations when there are changes in power or significant changes in core design in conjunction with surveillance capsule results from the BWRVIP Integrated Surveillance Program (reports BWRVIP –78, BWRVIP -86 and BWRVIP-116). See the Reactor Vessel Surveillance Program (B.1.23) for additional discussion.

4.2.4 REACTOR VESSEL CIRCUMFERENTIAL WELD EXAMINATION RELIEF

Summary Description

Relief from reactor vessel circumferential weld examination requirements under Generic Letter 98-05 is based on probabilistic assessments that predict an acceptable probability of failure per reactor operating year. The analysis is based on reactor vessel metallurgical conditions as well as flaw indication sizes and frequencies of occurrence that are expected at the end of a licensed operating period.

Oyster Creek has received this relief for the remainder of the 40 year licensed operating period (Reference 4.8.27). The circumferential weld examination relief analysis meets the requirements of 10CFR54.3(a) and is a TLAA.

Analysis

Oyster Creek received NRC approval for a technical alternative, which eliminated the reactor vessel circumferential shell weld inspections for the current license term. The basis for this relief request was an analysis that satisfied the limiting conditional failure probability for the circumferential welds at the expiration of the current license, based on the BWR Vessel and Internals Project Report BWRVIP-05, and the extent of neutron embrittlement. The anticipated changes in metallurgical conditions expected over the extended licensed operating period require an analysis for 50 EFPY and approval by the NRC to extend this relief request.

Disposition: Revision, 10 CFR 54.21(c)(1)(ii)

The circumferential weld examination relief request was reevaluated in accordance with BWRVIP-74-A (Reference 4.8.24), which provides a basis for supporting the elimination of reactor pressure vessel (RPV) circumferential welds from the ISI program. The requirements for continuing this relief into the period of extended operation are provided in the NRC's SER for BWRVIP-74 (Reference 4.8.25).

The USNRC evaluation of BWRVIP-05 utilized the FAVOR code to perform a probabilistic fracture mechanics (PFM) analysis to estimate the RPV shell weld failure probabilities. Three key assumptions of the PFM analysis are: 1) the neutron fluence was the estimated end–of-life mean fluence, 2) the chemistry values are mean values based on vessel types, and 3) the potential for beyond-design-basis events is considered.

Table 4.2.4-1 provides a comparison of the Oyster Creek reactor vessel limiting circumferential weld parameters to those used in the NRC analysis for the first two key assumptions. Data provided in Table 4.2.4-1 was supplied from Table

4.4 of BWRVIP-05 (Reference 4.8.4) and Table 2.6-5 of the Final Safety Evaluation of BWRVIP-05 (Reference 4.8.7).

The Oyster Creek 50 EFPY fluence is slightly lower than the limits of the NRC analysis, and the chemistry factor is considerably lower for Oyster Creek. As a result, the shift in reference temperature (ΔRT_{NDT} w/o margin) is lower for Oyster Creek for 50 EFPY compared to the NRC analysis. In addition, the unirradiated reference temperature ($RT_{NDT(U)}$) for Oyster Creek is much lower. The combination of $RT_{NDT(U)}$ and ΔRT_{NDT} w/o margin yields an adjusted reference temperature that is considerably lower than the NRC mean analysis value. Therefore, the RPV shell weld embrittlement due to fluence has a negligible effect on the probabilities of RPV shell weld failure. The Mean RT_{NDT} value at 50 EFPY is bounded by the 64 EFPY Mean RT_{NDT} provided by the NRC. Although a conditional failure probability has not been calculated, the fact that the Oyster Creek 50 EFPY value is less than the 64 EFPY value provided by the NRC leads to the conclusion that the Oyster Creek RPV conditional failure probability is bounded by the NRC analysis.

The procedures and training used to limit cold over-pressure events will be the same as those approved by the NRC when Oyster Creek requested the BWRVIP-05 technical alternative be used for the current term (Reference 4.8.5). An extension of this relief for Oyster Creek for the 60-year period will be submitted to the NRC for approval prior to the period of extended operation.

Table 4.2.4-1
Effects for Irradiation on RPV Circumferential Weld Properties for Oyster Creek

Group	CE, 64 EFPY (VIP)[1]	CE, 64 EFPY (CEOG)[2]	Oyster Creek 50 EFPY[4]
Cu%	0.13	0.183	0.21
Ni%	0.71	0.704	0.07
CF	151.7	172.2	98.0
Fluence at clad/weld interface (10^{19} n/cm^2)	0.40	0.4	0.376
RT_{NDT}(U) (°F)	0	0	-50
ΔRT_{NDT} w/o margin (°F)	113.2	128.5	59.8
Mean RT_{NDT} (°F)[3]	113.2	128.5	9.8

Notes:

1. Chemistry Information reported in BWRVIP-05 (Reference 4.8.4).
2. Chemistry Information reported in Table 2.6-5 of the SER for BWRVIP-05 (Reference 4.8.7).
3. Mean RT_{NDT} was determined using the peak neutron fluence for the limiting weld.
4. The Oyster Creek Chemistry is obtained from the 'Recommended Value' in Reference 4.8.6.

4.2.5 REACTOR VESSEL AXIAL WELD EXAMINATION RELIEF

Summary Description

The Boiling Water Reactor Vessel and Internals Program (BWRVIP) recommendations for inspection of reactor vessel shell welds (BWRVIP-05, Reference 4.8.4) contain generic analyses supporting an NRC SER (Reference 4.8.7) conclusion that the generic-plant axial weld failure rate is no more than 5×10^{-6} per reactor year. BWRVIP-05 showed that this axial weld failure rate of 5×10^{-6} per reactor year is orders of magnitude greater than the 40-year end-of-life circumferential weld failure probability, and used this analysis to justify relief from inspection of the circumferential welds as described in Section 4.2.4. As such this analysis meets the requirements of 10 CFR 54.3(a) for a TLAA.

Analysis

The NRC SER associated with BWRVIP-05 (Reference 4.8.7) concluded that the reactor vessel failure frequency due to failure of the limiting axial welds in the BWR fleet at the end of 40 years of operation is less than 5×10^{-6} per reactor year. This failure frequency is dependent upon given assumptions of flaw density, distribution, and location. The failure frequency also assumes that "essentially 100%" of the reactor vessel axial welds will be inspected.

Due to various obstructions within the reactor vessel, Oyster Creek has not been able to meet the "essentially 100%" inspection requirement. For Oyster Creek, an analysis was performed to assess the effect on the probability of fracture due to the actual inspection performed on the vessel axial welds, and to determine if the coverage was sufficient in the inspection of regions contributing to the majority of the risk. The analysis included an estimate and comparison of the probability of failure for the cases of "essentially 100%" inspection and the limited scope inspections on the Oyster Creek vessel axial welds. The analysis concluded that the conditional probabilities of failure due to a low temperature over pressurization event are very small for Oyster Creek. The NRC SER containing approval for limited axial weld inspection coverage is documented in Reference 4.8.5.

The NRC approved Oyster Creek analysis for reduced axial weld inspection coverage only applies to the current 40-year period. The anticipated changes in metallurgical conditions expected over the extended licensed operating period require an additional analysis for 50 EFPY and approval by the NRC to extend the reactor vessel axial weld inspection relief request. The re-analysis concluded that the probability of failure due to a low temperature over pressurization event remain very small for Oyster Creek (approximately 2.9×10^{-9} per year).

Disposition: Revision, 10 CFR 54.21(c)(1)(ii)

Table 4.2.5-1 compares the limiting axial weld 50 EFPY properties for Oyster Creek against the values taken from Table 2.6-5 found in the NRC SER for BWRVIP-05 (Reference 4.8.7) and the associated supplement to the SER (Reference 4.8.8). The SER supplement required the limiting axial weld to be compared with data found in Table 3 of the document. For Oyster Creek, the comparison was made to the Combustion Engineering Owners' Group (CEOG) information since CE manufactured the Oyster Creek RPV.

The Oyster Creek limiting axial weld chemistry, chemistry factor (CF), and 50 EFPY mean RT_{NDT} values are within the limits of the values assumed in the analysis performed by the NRC staff in the March 7, 2000 BWRVIP-05 SER Supplement (Reference 4.8.8) and the 64 EFPY limits and values obtained from Table 2.6-5 of the SER. The 50 EFPY mean RT_{NDT} is also less than those specified in Table 1 of the NRC SER for BWR-74 (Reference 4.8.25), satisfying Renewal Applicant Action item 12.

As stated above, the probability of a failure event, P_{FE}, calculated by the NRC in the BWRVIP-05 SER and its supplements depends in part on an assumption that essentially 100% (≥90%) of axial welds can be inspected. At Oyster Creek less than 90% of the axial welds can be examined. As such, an analysis was performed for 50 EFPY to assess the effect on the probability of fracture due to the actual inspection performed on the vessel axial welds and to determine if the coverage is sufficient in the inspection of regions contributing to the majority of the risk. The analysis included the estimate and comparison of the probability of failure for both the case of "essentially 100%" inspection and the actual limited scope inspections on the Oyster Creek vessel axial welds. The analysis concluded that the conditional probability of failure due to a low temperature over pressurization event is very small for Oyster Creek, 5.8×10^{-8} on a per year basis for the actual inspection coverage. The evaluation shows that this calculated unit-specific axial weld conditional failure probability at 50 EFPY for Oyster Creek (5.8×10^{-8}) is less than the failure probabilities calculated by the NRC staff in the SER at 64 EFPY and the limiting CEOG values found in Table 3 of the SER supplement. The probability of failure of an axial weld at Oyster Creek will therefore provide adequate margin above the probability of failure of a circumferential weld, in support of relief from inspection of circumferential welds, for the extended licensed operating period. An extension of this relief for Oyster Creek for the 60-year period will be submitted to the NRC for approval prior to the period of extended operation.

Table 4.2.5-1
Effects for Irradiation on RPV Axial Weld Properties for Oyster Creek

Group	CE, 64 EFPY (VIP)[1]	CE, 64 EFPY (CEOG)[2]	Oyster Creek 50 EFPY[4]
Cu%	0.26	0.219	0.21
Ni%	1.20	0.996	0.05
CF	276.0	231.1	96.0
Fluence at clad/weld interface (10^{19} n/cm^2)	0.30	0.40	0..371
RT_{NDT}(U) (°F)	-20	0	-8
ΔRT_{NDT} w/o margin (°F)	185.0	172.4	58.3
Mean RT_{NDT} (°F) [3]	165.0	172.4	50.3

Notes:

1. Chemistry Information reported in BWRVIP-05 (Reference 4.8.4).
2. Chemistry Information reported in Table 2.6-5 of the SER for BWRVIP-05 (Reference 4.8.7).
3. Mean RT_{NDT} was determined using the peak neutron fluence for the limiting weld.
4. The Oyster Creek Chemistry is obtained from the 'Recommended Value' in Reference 4.8.6.

4.2.6 CORE REFLOOD THERMAL SHOCK ANALYSIS

Summary Description

Oyster Creek as a BWR2 does not have jet pumps and therefore post DBA LOCA reflood of the core does not occur. There is no reflood analysis that has been performed for Oyster Creek; therefore, Reflood Thermal Shock analysis is not applicable to Oyster Creek.

4.2.7 REACTOR INTERNALS COMPONENTS

Summary Description

A number of the reactor internals components are subject to high fluence because of their proximity to the core. This high fluence can lead to stress relaxation for bolting or irradiation assisted stress corrosion cracking (IASCC) for other components. Because the fluence experienced by components is a function of the life of the plant the NRC SERs for BWRVIP-25 and BWRVIP-26 have identified that neutron aging of these components is a TLAA issue. BWRVIP-25 identifies stress relaxation of the core plate rim hold down bolts as a TLAA issue.

BWRVIP-26 identifies that BWR stainless steel components exposed to a fluence greater than $5x10^{20}$ n/cm^2 (E > 1 MeV) are susceptible to irradiation assisted stress corrosion cracking (IASCC). The SER for BWRVIP-26 considers IASCC of BWR reactor internals a TLAA issue.

Analysis

Oyster Creek has installed core plate wedges, which structurally replace the lateral load resistance provided by the rim hold down bolts. Therefore failure of the bolts due to stress relaxation is not a concern. Because core plate wedges have been installed a calculation of stress relaxation of the rim hold down bolts has not been performed. Furthermore, BWRVIP-25 does not recommend inspection of the rim hold down bolts if wedges are installed. As such, a TLAA is not applicable for the Oyster Creek core plate hold down bolts.

Fluence calculations have been performed for the internals. The core shroud, incore instrumentation dry tubes, and top guide have experienced fluence greater than $5x10^{20}$ n/cm^2 (E > 1 MeV) and are considered susceptible to IASCC. No TLAA associated with IASCC exists for the core shroud, incore dry tubes, or top guide.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The top guide, core shroud, and incore dry tubes are considered susceptible to IASCC and require aging management. All three components (top guide, core shroud, and incore dry tubes) have been evaluated by the BWRVIP, as described in the Inspection and Evaluation Guidelines for each component: BWRVIP-26 (Top Guide), BWRVIP-76 (Core Shroud), and BWRVIP-47 (incore dry tubes). The BWRVIP recommendations are implemented at Oyster Creek by the BWR Vessel Internals program (B.1.9).

4.3 METAL FATIGUE OF THE REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT PRESSURE BOUNDARY PIPING AND COMPONENTS

A cyclically loaded metal component may fail because of fatigue even though the cyclic stresses are considerably less than the static design limit. Some design codes therefore contain explicit metal fatigue calculations or design limits, such as the ASME Boiler and Pressure Vessel Code and the USAS piping codes. Cyclic or fatigue design of other components may not be to these codes, but may use similar methods. These analyses, calculations and designs tied to cycle count limits or to fatigue usage factor limits may be TLAAs.

Fatigue analyses are presented in the following groupings:

- Reactor Vessel Fatigue Analyses
- Reactor Vessel Internals Fatigue Analysis
- Reactor Coolant Pressure Boundary Piping and Component Fatigue Analysis
    - Piping and Components
    - Isolation Condenser Fatigue Analysis
- Effects of Reactor Coolant Environment on Fatigue Life of Components and Piping (Generic Safety Issue 190)

NUREG-1801 identifies numerous fatigue related aging effects that require evaluation as possible TLAAs in accordance with 10 CFR 54.21(c). Each of these is summarized in NUREG-1800 and presented in Section 3 of this LRA and referenced to the appropriate TLAA section.

4.3.1 REACTOR VESSEL FATIGUE ANALYSES

Summary Description

Reactor vessel fatigue analyses of the vessel, including the vessel support skirt, shell, upper and lower heads, closure flanges, nozzles and penetrations, nozzle safe ends, basin seal skirt support, and closure studs depend on the assumed numbers and the severity of normal and upset-event pressure and thermal operating cycles to predict end-of-life fatigue usage factors.

These assumed cycle counts used to determine fatigue usage factors are based the 40 years life of the plant. The calculation of fatigue usage factors is part of the current licensing basis and is used to support safety determinations. As such the reactor vessel fatigue analysis meets the requirements of 10 CFR 54.3(a) for a TLAA.

Analysis

The original reactor pressure vessel stress report included a fatigue analysis for the reactor vessel components based on a set of design basis duty cycles. These duty cycles are listed in Table 5.2-2 of the Oyster Creek UFSAR, and are shown in Table 4.3.1-1. The original 40-year analyses demonstrated that the cumulative usage factors (CUF) for the critical components would remain below the allowable fatigue usage value of 0.8 specified in the Oyster Creek design basis for the reactor vessel. Note that the Oyster Creek reactor vessel was designed in accordance with ASME Code Sections I and VIII (i.e., it pre-dated ASME Code Section III, including Code Case Interpretations 1270N and 1273N). Sections 3.1.26, 5.2.2.1 and 5.3.1.1 of the Oyster Creek UFSAR documents the original RPV Purchase Specification reactor vessel design requirements, including the allowable fatigue usage value of 0.8 for the reactor pressure vessel.

The original code analysis of the reactor vessel included fatigue analysis of the feedwater and control rod drive return line nozzles. After several years of operation, it was discovered that both the control rod drive hydraulic system return line nozzles and the feedwater nozzles experienced cracking caused by a number of factors including rapid thermal cycling. Consequently, the control rod system return line nozzle thermal sleeve was modified and reanalyzed using guidance from ASME Code Section III NG-3000 requirements, and the impact of the modifications on the nozzle was evaluated in accordance with the original Oyster Creek reactor vessel design limits. This revised analysis included the appropriate effects from rapid thermal cycling that were attributed to the original cause of cracking in these nozzles. Similarly, a reanalysis was later performed on the feedwater nozzles along with repairs and hardware modifications to minimize the effects of fatigue on these components. The feedwater nozzle thermal sleeves and spargers were modified and reanalyzed using guidance from ASME Code Section III NG-3200 requirements, and the impact of the modifications on the nozzles was evaluated in accordance with the original Oyster Creek reactor vessel design limits. This revised analysis included the appropriate effects from rapid thermal cycling and on/off flow cycling that were attributed to the original cause of cracking in the feedwater nozzles.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The list of design transients used in the RPV fatigue analysis was intended to envelope all foreseeable thermal and pressure cycles, which could be expected to occur within a nominal 40-year operating period for the plant. The list of design transients is shown in Table 4.3.1-1. This list also encompasses all transients listed in Table 5.2-2 of the Oyster Creek UFSAR. The actual numbers of events experienced to date (1/1/04) is listed in Table 4.3.1-1. The number of transients experienced to date for the reactor vessel and other analyzed components was compiled from plant operating records. The sources included operator log books, event reports, NRC correspondence, surveillance test results, cycle counting program records, equipment logs and operating experience reports. The number of occurrences expected for 40 and 60 years of operation was obtained by extrapolating the numbers of occurrences actually incurred to date, using the rate of occurrence experienced during the last ten years of operation. The frequency of events, such as scrams and shutdowns, experienced in the last ten years is significantly less than that experienced during the first 20-25 years of operation and is expected to remain equal to or less than the trend over the past ten years through the period of extended operation by maintaining careful attention to good operating practices.

The projected number of occurrences for each event for 40 and 60 years is also included in Table 4.3.1-1, as are the number of cycles assumed in the design basis 40-year fatigue analyses. The number of design basis cycles does not represent a limit. The fatigue for a component is normally the result of several different thermal transients. Exceeding the number of cycles for one event does not necessarily imply the fatigue usage will exceed an acceptance limit. For those components where the 60-year fatigue usage (based on the use of projected cycles for 60 years) was predicted to be greater than the acceptance limit of 0.8 (e.g., the reactor vessel closure studs and vessel support skirt), the fatigue was reanalyzed using more refined methods to demonstrate fatigue usage less than the acceptance limit for 60 years.

The fatigue cumulative usage factors (CUFs) of the reactor vessel, including the support skirt, shell, upper and lower heads, closure assembly, nozzles and penetrations, and nozzle safe ends will be managed by the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program. This program will monitor CUFs through either stress-based fatigue (SBF) monitoring or cycle-based fatigue (CBF) monitoring versus the allowable value.

Stressed-based fatigue monitoring consists of computing a “real time” stress history for a given component from actual temperature, pressure, and flow histories via a finite element based Green’s Function approach. CUF is then computed from the computed stress history using appropriate cycle counting techniques and appropriate ASME Code, Section III fatigue analysis methodology. SBF monitoring is intended to duplicate the methodology used in the governing ASME Code stress report for the component in question, but uses actual transient severity in place of design basis transient severity.

Cycle-based fatigue monitoring consists of a two-step process: (a) automated cycle counting, and (b) CUF computation based on the counted cycles. Automated cycle counting evaluates each transient that is defined in the plant licensing basis based upon the mechanistic process or sequence of events experienced by the plant (as determined from monitored plant instruments). The approach is conservative because it assumes each actual transient has a severity equal to that assumed in the design basis. The unique severity of any transient identified by the aging management program software is captured for each monitored component, for ready comparison to design basis transient severity. Transients defined in the Oyster Creek UFSAR are identified and implemented into the aging management program software. CUF computation calculates fatigue directly from counted transients and parameters for the monitored components. CUF is computed via a design-basis fatigue calculation where the numbers of cycles are substituted for assumed design basis number of cycles. The CUF calculations are conservative in that design basis transient severity is assumed.

All locations with CUFs predicted to exceed 0.4 in the original design basis fatigue analysis will be included in the program. For Oyster Creek reactor vessel the vessel head closure bolts, the vessel support skirt, and the basin seal skirt support meet this criterion. In addition, the locations identified in NUREG/CR-6260 for the older-vintage BWR, which have been evaluated for environmental fatigue effects as discussed in Section 4.3.4 below, have been included in the program. The list of monitored reactor pressure vessel points is listed in Table 4.3.1-2.

Three of the reactor vessel components, the closure bolts, RPV support skirt, and the RPV basin seal skirt (refueling bellows) support, indicated fatigue usage over the allowable value after 60 years of operation when using the original fatigue methodology from the reactor vessel stress report. The original fatigue analysis pre-dated the issuance of ASME Section III and established conservative fatigue rules and acceptance criterion for CUF of 0.8.

The fatigue usage for these components was re-analyzed in accordance with Non-Mandatory Appendix L, Article L-2000 of ASME Section XI (1995 Edition including the 1996 Addenda), portions of which have been accepted for use by the NRC. Article L-2000 provides guidance for operating plant fatigue issues, and allows the use of Editions and addenda of ASME, Section III later than the Construction Code to evaluate fatigue usage for operating plants where a fatigue issue has been identified. This approach has been approved through 10 CFR 50.55(a). Article L-2000 also establishes that a RCPB component is acceptable for continued service if the CU F is less than or equal to 1.0.

The updated 60-year fatigue usage (CUF_{60}) using ASME Section III (1996 Addenda) fatigue methodology was evaluated for the closure bolts, RPV support skirt, and the basin seal skirt. These values are listed in Table 4.3.1-2. The CUF_{60} values are projected to be less than 1.0.

All necessary plant transient events, as shown in Table 4.3.1-1, will be tracked to ensure that the CUF remains less than the allowable CUF limit for all monitored components. In the event the monitored CUF is predicted to exceed the allowable value for any component prior to 60 years of operation, appropriate corrective action will be taken in accordance with the corrective action process. Oyster Creek has an existing program in place to track operating thermal and pressure cycles and to assess their effect on vessel fatigue. The requirements from this program will be incorporated into the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program. The required implementing actions will be completed prior to the period of extended operation.

Table 4.3.1-1
Reactor Design Transients and 60-Year Cycle Projections

No.	Transient	Included in Table 5.2-2 of UFSAR?	Cycles as of 1/1/04	40-Year Projected Number of Cycles	60-Year Projected Number of Cycles	Design Analyzed Number of Cycles
1 / 2	Vessel Head Removal and Reinstallation (Boltup/Unbolt)		23	26	36	80
3	Design Pressure Test (Leak Test at Operating Pressure)		24	27	37	130
4	Heatup = Normal Startup (100°F/hr)	Y	213	225	272	240
5	Turbine Roll and Increase to Rated Power		181	194	246	240
6	Cooldown = Normal Shutdown (100°F/hr)	Y	212	225	272	240
8	Hot Standby (Feedwater Cycling)	Y (1)	178	188	226	400
9	300°F/hr Emergency Cooldown		0	0	1	5
10	Safety Relief Valve (EMRV) Blowdown		0	0	1	1
11	SCRAM	Y (2)	139	142	155	200
16	Turbine Trip		38	39	43	40
17	Loss of Feedwater Heaters		4	5	9	80
18	Interruption of Feedwater Flow		1	1	2	80
19	Overpressure to 1,250 psig		0	0	1	1
20	Overpressure to 1,375 psig		0	0	1	1
21	Hydrostatic Pressure Test (Code Hydro Test to 1,563 psig)		1	1	1	3
22	Core Spray Injections	Y	2	2	3	10
23	EMRV 'A' Actuation		121	131	167	450
	EMRV 'B' Actuation		67	77	115	450
	EMRV 'C' Actuation		80	88	120	450
	EMRV 'D' Actuation		129	141	188	450
	EMRV 'E' Actuation		68	76	108	450
27	Shutdown Cooling 'A' Operation		20	20	20	Note 3
	Shutdown Cooling 'B' Operation		21	21	21	Note 3
	Shutdown Cooling 'C' Operation		181	195	248	Note 3,4
28	Emergency Condenser 'A' Actuation		350	378	482	1500
	Emergency Condenser 'B' Actuation		388	416	520	1500
29	Unisolation of an Isolated Recirculation Loop		12	20	50	6,500

Notes:

1. Includes "Temperature Change 240°F" event.
2. Includes "Loss of Drive Coolant" event.
3. Not specified in original design of system.
4. Loop C is by procedure used first for the initial operation of (Shutdown Cooling) SDC during a shutdown. The initial operation of SDC experiences the greatest temperature change and therefore is the bounding fatigue event for SDC. Subsequent operation of the other loops produces insignificant temperature changes. The remaining number operations of SDC through the period of extended operation are conservatively assumed to only occur with loop C.

Table 4.3.1-2
Fatigue Monitoring Locations for Reactor Pressure Vessel Components

Component	Computed Fatigue Usage Factor (40 Years) (Note 1)	Computed Fatigue Usage Factor (60 Years)	Monitoring Technique (Notes 3, 4)
Closure Region (Bolts)	0.155 (Note 2)	0.196 (Note 2)	CBF
Bottom Head (Vessel-Head Junction)	0.0018	0.0042 (Note 5)	CBF (NUREG/CR-6260 component)
Support Skirt (transition taper top)	0.6923	0.710 (Note 2)	CBF
Feedwater Nozzle (Nozzle Forging)	0.952	0.8433 (Note 5)	SBF (NUREG/CR-6260 component)
Recirculation Inlet Nozzle	0.0086	0.1554 (Note 5)	CBF (NUREG/CR-6260 component)
Recirculation Outlet Nozzle	0.2413	0.978 (Note 5)	CBF (NUREG/CR-6260 component)
RPV Core Spray Nozzle Safe End	0.002	0.0072 (Note 5)	CBF (NUREG/CR-6260 component)
RPV Core Spray Nozzle Forging	0.0029	.0129 (Note 5)	CBF (NUREG/CR-6260 component)
Basin Seal Skirt to Vessel Flange Junction	0.7725	0.270 (Note 2)	CBF

Notes:

1. Based on the current 40-year fatigue analysis, except as noted.
2. Re-computed for based on actual projected cycles, in accordance with Appendix L of ASME Code, Section XI.
3. CBF = Cycle-Based Fatigue and SBF = Stress-Based Fatigue.
4. All locations with 40-year design basis CUFs expected to exceed 0.4 based on the original analysis will be included in the program. In addition, the locations identified in NUREG/CR-6260 for the older-vintage BWR, which have been evaluated for environmental fatigue effects as discussed in Section 4.3.4, have been included in the program.
5. Computed for 60-years using actual projected cycles including environmental effects.

4.3.2 FATIGUE ANALYSIS OF REACTOR VESSEL INTERNALS

The design codes described in Section 4.3.1 did not require a fatigue analysis to be performed for non-pressure boundary components of the reactor pressure vessel. However, the Oyster Creek license renewal process reviewed the existing licensing basis analyses for additional analyses that may contain fatigue analyses. The review of the current licensing basis found no fatigue analysis on the reactor vessel internals with the exception of one associated with the shroud repairs.

4.3.2.1 Low-Cycle Thermal and Flow-Induced Vibration Fatigue Analysis of the Core Shroud and Repair Hardware

Summary Description

Only one analysis of low-cycle fatigue of reactor vessel internals was identified for Oyster Creek, which includes an evaluation of the core shroud and core shroud repair hardware. The core shroud repair SER for Oyster Creek states that the limiting upset loading condition is the cold feedwater transient. This event was determined in the design analysis for the repair to be the most significant contributor to fatigue usage. As such, the analysis is a TLAA.

Analysis

A review of licensing basis documents found no evidence of analyses of pressure or thermal cycle fatigue for the core plate, top guide, fuel supports, in-core instrumentation tubes, or control rod drive assemblies. Low-cycle mechanical fatigue was mentioned only for the tie rod stabilizers in the core shroud repair evaluations.

The USNRC Safety Evaluation of the core shroud repair for Oyster Creek (Reference 4.8.9) states:

> “The most limiting upset transient is considered to be the design basis cold feedwater transient. During this transient, due to injection of cold feedwater into the shroud annulus, a maximum temperature difference of 130°F between the shroud and the cooler tie rod components could exist. This would cause an increase in the tensile load on the tie rods. Special features are provided in the tie rod design to accommodate this temperature difference. Specifically, a variable spring design was implemented that minimizes rod stiffness for thermal transients, when stiffness is undesirable, and offers increased stiffness and strength for large pressure drop transients. The staff has reviewed the licensee’s calculations in Appendix C of the design report and finds them acceptable. The calculations indicate that stresses in the tie rod components meet ASME Code Section III, Subsection NB, Paragraphs 3222 and 3223 allowable stresses for this transient.”
>
> “The tie rods were analyzed and tested to ensure that reactor coolant flow would not induce unacceptable vibration. Results of these analyses and tests are presented in Appendix D of the licensee’s proprietary design report. The

staff has reviewed the licensee's analyses and finds that the stresses resulting from flow-induced vibration are acceptable from a fatigue standpoint."

Appendix C of the tie rod design report documents maximum usage factor for the tie rod components as less than 0.04 for the limiting thermal event. Therefore, the maximum calculated fatigue usage was found to be insignificant compared to the allowable usage and is, therefore, acceptable.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The current predicted 40-year cumulative usage factor for the Oyster Creek core shroud and core shroud repair hardware is less than 0.04. In 60 years this would translate to 0.06. These usage values are small compared to the acceptance limit of 1.0. Moreover, the repair hardware was designed for a 40-year life. Since the shroud repairs installed in 1994, the design of the core shroud repair hardware for fatigue effects remains valid for the extended licensed operating period.

4.3.3 REACTOR COOLANT PRESSURE BOUNDARY PIPING AND COMPONENT FATIGUE ANALYSIS

This section describes fatigue-related TLAAs arising within design analyses of:

- Reactor Coolant Pressure Boundary Piping and Components
- Fatigue Analysis of the Isolation Condenser

4.3.3.1 Reactor Coolant Pressure Boundary Piping and Components

Summary Description

The reactor coolant pressure boundary (RCPB) piping for Oyster Creek was designed to ASME Section I, as stated in Section 3.1.26 of the UFSAR (Reference 4.8.2). ASME Section I refers to ASA B31.1 for design requirements except for materials. In addition, the reactor recirculation pumps were designed per ASA B31.1 (1955) and ASME Section VIII (Table 5.1-1 of Reference 4.8.2). All remaining non-RCPB piping was analyzed based on ASA B31.1 (1955) or ASME. In a few instances piping was designed to ASME Section II class 2 or 3. In addition, all eleven Class I (seismic) piping systems were evaluated based on USAS B31.1 (1983, Winter 1984 Addenda) (Section 3.9.3.1 of Reference 4.8.2).

Analysis

The piping in the scope of license renewal, designed to ASA B31.1 or ASME Section III Class 2 and 3, did not invoke fatigue analyses for piping or component supports, nor for their welds, bolted connections, or anchors. However, these Codes require the application of a stress range reduction factor to the allowable stress range for secondary (expansion and displacement) stresses to account for thermal cyclic condition. The allowable secondary stress range is 1.0 S_A for 7,000 equivalent full-temperature thermal cycles or less, and is reduced in steps to 0.5 S_A for greater than 100,000 cycles. Maintaining thermal cycles within the limits assumed in fatigue analyses or the cycles established by ASA B31.1 ensures the piping, pipe fittings, and bolting are within the fatigue limits.

As described above, all of the Oyster Creek piping was designed using stress range reduction factors for a finite number of thermal cycles. Because the number of cycles increases with the operating life of the plant, the above piping design satisfies the requirements of 10 CFR 54.3 and is therefore considered to be a TLAA.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The assumed thermal cycle count for the analyses used in the codes associated with piping and components can conservatively be approximated by the thermal cycles used in the reactor vessel fatigue analysis. Some of these thermal cycles are listed in UFSAR Table 5.2-2. Based on a detailed review of components and assessments performed as a part of the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program, additional thermal cycles were also identified. When combined, the total count of the thermal cycles in Table 4.3.1-1 is less than 2,700 for a 40-year plant operating period. For the 60-year extended operating period, the number of thermal cycles for piping analyses would be proportionally increased to less than 3,500, a fraction of the 7,000-cycle threshold. Therefore, the existing piping analyses within the scope of license renewal containing assumed thermal cycle counts are valid for the period of extended operation.

4.3.3.2 <u>Fatigue Analysis of the Isolation Condenser</u>

Summary Description

The Oyster Creek isolation condenser provides core cooling when the reactor vessel becomes isolated from the turbine and the main condenser. The UFSAR indicates that the isolation condenser was designed for 1,500 cycles of operation (Table 6.3-1 of Reference 4.8.2). Fatigue evaluation of the Oyster Creek isolation condenser was not performed as a part of original component design. However, subsequent stress and fatigue evaluations were performed for portions of the isolation condenser system: (1) the isolation condenser piping outside of the containment was evaluated for fatigue as a part of a leak-before-break (LBB) analysis completed in 1991, (2) transient stress analysis was performed for the isolation condenser tubes as a part of tube bundle replacement in 1998. A plant specific stress analysis performed for the replacement tube bundles states that the design life of the tube bundle is 1500 cycles. Additionally a comparison between the Nine Mile Point Unit 1 and Oyster Creek isolation condensers determined that the two condensers are similar enough for the Nine Mile Point Unit 1 stress and fatigue results to be considered bounding when applied to Oyster Creek. These stress and fatigue analyses, when applied to the Oyster Creek associated with the isolation condenser, demonstrate that the 40-year cumulative usage factors (CUF) for the critical components of the isolation condenser are below the ASME Code Section III allowable value of 1.0. The fatigue analyses as applied to the Oyster Creek isolation condenser meets the requirements of 10 CFR 54.3(a) for a TLAA.

Analysis

The analysis for the replacement tube bundle indicated that the resultant fatigue after 1500 cycles is insignificant based on a comparison of applied primary plus secondary plus peak stresses to allowable. In the Nine Mile Point Unit 1 fatigue analysis the isolation condenser components were evaluated for 5,000 heatup/pressurization cycles (i.e., 125 cycles per year for 40 years). These cycles were conservatively treated as thermal shock events between an ambient temperature of 40°F and a temperature of 562°F. Six cycles of seismic loading were also evaluated. The limiting thermal shock event was assumed to be caused by a sudden inlet of steam to the condenser in a standby state.

The isolation condenser supporting system piping and components were evaluated for 400 heatup/pressurization cycles (i.e., 10 cycles per year for 40 years). These cycles were conservatively treated as thermal shock events between an ambient temperature of 70°F and the design temperature of 575°F. Five of the cycles also included seismic loading. The limiting thermal shock event was assumed to be caused by an isolation event where the piping contained condensed ambient fluid followed by subsequent hot steam flow.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

Records of the number of actual isolation condenser operations were not kept during the first several years of operation. Therefore, record keeping of isolation condenser operations began in the 1980's, and further efforts were performed in 2004 to obtain a more accurate number of past isolation condenser events.

Based on review of past plant operation, it has been estimated that there have been a total of approximately 738 isolation condenser events from initial operation (December 1969) through December 2004. Of these 738 events, 350 events occurred in the "A" isolation condenser, 380 events occurred in the "B" isolation condenser, and 8 events occurred where the records did not indicate which of the two isolation condensers was actuated. Based on trending of events over the most recent 10 years of plant operation, and assuming the unidentified isolation actuations occurred in the limiting "B" isolation condenser, there has been an accumulation rate of 5.22 isolation condenser events per year. Therefore, for the extended period of operation (60 years), the total number of isolation condenser operations is predicted to be approximately 520 (388 events + [5.22 events/year x 25.27 years]). This projected cycle count is less than the 1500 cycles of isolation condenser operation used in the design evaluation for the isolation condenser components. Therefore, the design analysis of the isolation condenser components remains acceptable for the extended period of operation.

For the isolation condenser supporting system piping and components, the 520 events projected for 60 years exceeds the 400 events used in the design evaluation. However, the "B" isolation condenser tube bundles were replaced in 1998, and the "A" isolation condenser tube bundles were replaced in 2000). The isolation condenser piping outside the drywell was replaced in 1992.

Conservatively using 1992 as the starting point for all of these supporting system piping and components, there have been a total of approximately 76 isolation condenser events from 1992 through December 2004 for each of the “A” and “B” isolation condensers. Based on trending of events over the most recent 10 years of plant operation, there has been an accumulation rate of 5.22 isolation condenser events per year. Therefore, for the extended period of operation (60 years), the total number of expected isolation condenser operations would be approximately 208 (76 events + [5.22 events/year x 25.27 years]). This projected cycle count is significantly less than the 400 cycles of isolation condenser operation used in the design evaluation for the isolation condenser supporting system piping and components.

The Oyster Creek evaluation for the isolation condenser tube replacement demonstrated that stresses remained within allowable limits. Fatigue usage was not specifically calculated, but the implication of the stress evaluation results was that fatigue usage would be insignificant for the tube bundle assembly. In view of the similarities between the Oyster Creek and Nine Mile Point Unit 1 isolation condensers, as well as the fact that the Nine Mile Point Unit 1 isolation condenser analyses provided more limiting fatigue results than those indicated by the Oyster Creek specific analyses, it was decided to make use of the fatigue analyses from Nine Mile Point Unit 1 as a means of including the isolation condenser into the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program for Oyster Creek.

Table 4.3.3-1 summarizes the fatigue cumulative usage factor (CUF) values from the Nine Mile Point Unit 1 analyses described above. Consistent with the RPV and piping evaluations described above, the locations shown in Table 4.3.3-1 represent all isolation condenser locations with design basis CUFs expected to exceed 0.4. These locations will be included in the Oyster Creek Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program. In addition, for the isolation condenser piping inside the drywell, the additional fatigue analysis described in Section 4.3.4 for the limiting location of the recirculation piping (which also includes the isolation condenser and shutdown cooling piping attached to the recirculation piping) will be included in the program. Therefore, the design analysis of the isolation condenser supporting system piping and components remains acceptable for the extended period of operation.

The relevant plant transient events that contribute to isolation condenser fatigue, as shown in Table 4.3.1-1, will be tracked to ensure that the CUF remains less than the allowable CUF limit for all monitored isolation condenser components. Because the fatigue usage analysis assumed 5000 cycles of operation and due to the fact that many components have been replaced , the cumulative fatigue usage for the isolation condenser and associate components is predicted to remain well within the acceptance limit of 1.0.

For the isolation condenser piping inside the drywell, the additional fatigue analysis described in Section 4.3.4 for the recirculation piping (which also includes the isolation condenser and shutdown cooling piping attached to the recirculation piping) demonstrates acceptability for 60 years of plant operation.

Therefore, the design analysis of the isolation condenser supporting system piping and components remains acceptable for the extended period of operation.

Table 4.3.3-1
Isolation Condenser Fatigue Usage Summary

Component	Design Basis Fatigue Usage (1)
Tubing	0.625
Tube sheet	0.595
Nozzle Junction	0.581
Tube-to-Tube sheet Weld	0.714

Note:

1. These fatigue usage values are for the Nine Mile Point 1 isolation condenser analysis, and are based on the assumption of 5,000 isolation condenser cycles.

4.3.4 EFFECTS OF REACTOR COOLANT ENVIRONMENT ON FATIGUE LIFE OF COMPONENTS AND PIPING (GENERIC SAFETY ISSUE 190)

Summary Description

ASME Section III uses stress versus allowable cycle curves (S-N curves) based on tests in air to determine a fatigue usage factor. Generic Safety Issue (GSI) 190 addresses the effects of reactor coolant environment on fatigue life of components and piping. The environment of a stressed component can affect fatigue life. Although GSI 190 is resolved, NUREG-1800 states "The applicant's consideration of the effects of coolant environment on component fatigue life for license renewal is an area of review" (Section 4.3.1.2). The GSI-190 review requirements are therefore imposed by NUREG-1800 and do not depend on the individual plant licensing basis.

Analysis

The NRC staff assessed the impact of reactor water environment on fatigue life at high fatigue usage locations and presented the results in NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components,” March 1995. Formulas currently acceptable to the staff for calculating the environmental correction factors for carbon and low-alloy steels are contained in NUREG/CR-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels,” and those for austenitic stainless steels are contained in NUREG/CR-5704, “Effects of LWR Coolant Environments on Fatigue Design of Austenitic Stainless Steels.”

In order to comply with the requirements of GSI-190, Oyster Creek would be required to perform plant specific calculations at Oyster Creek for the locations identified in NUREG/CR-6260 for the older vintage BWR plants. For each of these locations, detailed environmental fatigue calculations would have to be performed using the appropriate environmental fatigue relationship (F_{en}) from NUREG/CR-6583 (for carbon/low alloy steels) and NUREG/CR-5704 (for stainless steels), as appropriate for the material for each location. The detailed calculations must include the calculation of an appropriate F_{en} factor for each individual load pair in the governing fatigue calculation so that an overall multiplier on CUF for environmental effects can be determined for each location.

Disposition: Revision, 10 CFR 54.21(c)(1)(ii) and Aging Management, 10 CFR 54.21(c)(1)(iii)

For license renewal plant-specific calculations have been performed for Oyster Creek for the locations identified in NUREG/CR 6260 for older-vintage BWR. These locations are:

- Reactor Vessel (Lower Head to Shell Transition)
- Feedwater Nozzle
- Recirculation System (Residual Heat Removal Return Line Tee, or the Shutdown Cooling Return Line Tee at Oyster Creek, and the RPV inlet and outlet nozzles)
- Core Spray System (Nozzle and Safe End)
- Residual Heat Removal (RHR) Line (Tapered Transition) – Oyster Creek does not have a RHR system. This location is bounded by the Isolation Condenser Return Line Tee
- Limiting Class 1 Location in a Feedwater Line

The list above does not specifically include the feedwater line (Reactor Core Isolation Cooling tee) location identified in NUREG/CR-6260 for the older-vintage GE plant. Oyster Creek does not have a Reactor Core Isolation Cooling (RCIC) system. Therefore, the limiting Class 1 feedwater piping location was evaluated for environmental fatigue effects, which is consistent with the approach taken in NUREG/CR-6260.

For each location, detailed environmental fatigue calculations were performed using the appropriate F_{en} relationships from NUREG/CR 6583 for carbon and low-alloy steels and from NUREG/CR 5704 for stainless steels, as appropriate for the material at each of the above location. The calculations determined an appropriate F_{en} for each individual load pair in the governing fatigue calculation, and an overall multiplier on cumulative usage factor (CUF) for environmental effects was determined for each location. Since the environmental fatigue methodology documented in NUREG/CR-6583 and NUREG/CR-5704 is relatively “new” technology, it is intended to apply to “modern-day” fatigue analyses, i.e., applied to fatigue analyses that use current Code fatigue curves. The original fatigue analyses for the Oyster Creek RPV components are based on pre-Section III fatigue methodology. Therefore, in order to be technically correct, the environmental evaluations for Oyster Creek first “converted” the original fatigue evaluations for the RPV components into modern-day fatigue calculations using the 1996 Addenda of the ASME Code. This involved applying a Young's Modulus correction factor to the calculated stresses, applying K_e where appropriate, and utilizing the 1996 Addenda fatigue curve. Therefore, the original governing design basis fatigue calculation for 40 years was "converted" to a modern-day fatigue calculation for 60 years, followed by a fatigue calculation with environmental effects for 60 years. As a result of the conversion process, the allowable fatigue usage for the final environmental fatigue result is 1.0 (versus the 0.8 value used in the original RPV design basis for Oyster Creek).

The results of these calculations are shown in Table 4.3.4-1. The results demonstrate that CUF values, including appropriate environmental effects, are less than 1.0 for 60 years of plant operation in accordance with 10 CFR 54.21(c)(1)(ii). Since the CUF (including environmental effects) for all of the evaluated locations is less than the allowable value of 1.0 for 60 years of operation, expansion of the evaluation to include other locations is not deemed necessary. Based on experience, these critical locations represent the most limiting locations for environmental effects and therefore the results are bounding for the RCPB.

As noted in Section 4.3.1, all of the locations shown in Table 4.3.4-1 are included in the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program, and the CUF for these locations will continue to be tracked in accordance with 10 CFR 54.21(c)(1)(iii).

Table 4.3.4-1
Environmental Fatigue Results for Oyster Creek for NUREG/CR-6260 Components

NUREG/CR-6260 Location	Equivalent OCGS Location	Material	60-Year Fatigue Usage Factor (1)	60-Year Fatigue Usage Factor with Environmental Effects (2)	Overall Environmental Fatigue Multiplier
Reactor Vessel (Lower Head to Shell Transition)	Reactor Vessel (Vessel-Head Junction)	Low Alloy Steel	0.0004	0.0042	10.28
Feedwater Nozzle	Feedwater Nozzle	Low Alloy Steel	0.3889	0.8433	2.17
Recirculation System (RHR Return Line Tee and the RPV inlet and outlet nozzles)	Isolation Condenser Return Line Tee into SDC Line RPV inlet nozzle RPV outlet nozzle	Stainless Steel Low Alloy Steel Low Alloy Steel	0.0851 0.0151 0.131	0.493 0.1554 0.978	5.79 10.28 5.34
Core Spray System (Nozzle and Safe End)	Core Spray Nozzle Core Spray Nozzle Safe End	Low Alloy Steel Stainless Steel	0.0013 0.0006	0.0129 0.0072	10.28 12.48
Residual Heat Removal Line (Tapered Transition)	Bounded by Isolation Condenser Return Line Tee Location Above	Stainless Steel	N/A	N/A	N/A
Feedwater Line (Feedwater/RCIC Tee Connection)	Limiting Class 1 Location in the Feedwater Line	Carbon Steel	0.0789	0.178	2.26

Notes:

1. Revised fatigue usage factors were computed for all of the NUREG/CR-6260 components based on projected cycles for 60 years of plant operation and updated ASME Code fatigue methodology.
2. Environmental fatigue usage was computed using the methodology of NUREG/CR-6583 (for carbon/low alloy steels) and NUREG/CR-5704 (for stainless steels), as appropriate for the material for each location.

4.4 ENVIRONMENTAL QUALIFICATION OF ELECTRICAL EQUIPMENT (EQ)

10 CFR 50.49, Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants (Reference 4.8.10), requires that certain electrical and instrument and control (I&C) equipment located in harsh environments be qualified to perform their safety related functions in those harsh environments after the effects of in-service aging.

NUREG-1801 identifies numerous environmentally related aging analyses that require evaluation as possible TLAAs in accordance with 10 CFR 54.21(c). Each of these is summarized in NUREG-1800 and presented in Section 3 of this LRA and referenced to the appropriate TLAA section.

Summary Description

10 CFR 50.49(e)(5) contains provisions for aging that require, in part, consideration of all significant types of aging degradation that can affect component functional capability. 10 CFR 50.49(e)(5) also requires component replacement or maintenance prior to the end of designated life, unless additional life is established through ongoing qualification. 10 CFR 50.49(k) and (l) permit different qualification criteria to apply based on plant vintage. Supplemental EQ regulatory guidance for compliance with these different qualification criteria is provided in the Regulatory Guide 1.89, Revision 1, "Environmental Qualification of Certain Electrical Equipment Important to Safety for Nuclear Power Plants," (Reference 4.8.11), the Division of Operating Reactors (DOR) Guidelines (Reference. 4.8.12) and NUREG-0588 (Reference. 4.8.13).

All operating plants must meet the requirements of 10 CFR 50.49 for certain electrical and I&C components important to safety. 10 CFR 50.49 defines the scope of components to be included, and requires the preparation and maintenance of qualification documentation that includes component performance specifications, electrical characteristics, and environmental conditions. 10 CFR 50.49(f) establishes four methods of demonstrating qualification for aging and accident conditions. Compliance with 10 CFR 50.49 provides evidence that the component will perform its intended functions during and after a design basis accident after experiencing the effects of in-service aging.

The Oyster Creek EQ program was established to demonstrate that certain electrical components are qualified to perform their safety function in harsh plant environments after the effects of in-service aging. Harsh plant environments denotes areas of the plant that could be subject to the harsh environmental effects of a loss of coolant accident (LOCA) or high energy line break (HELB) including consideration of recirculating fluids. The Oyster Creek EQ program complies with the requirements of 10 CFR 50.49, or DOR Guidelines for that equipment presently qualified to DOR guidelines. The EQ-related equipment is identified in controlled equipment databases and equipment qualification binders.

The Oyster Creek EQ program manages component thermal, radiation and cyclic aging as applicable, through the aging evaluations based on 10 CFR 50.49, or DOR guidelines for those components presently qualified to DOR guidelines.

GSI-168, Environmental Qualification of Electrical Components

NRC guidance for addressing GSI-168 for license renewal is contained in the June 2, 1998, NRC letter to NEI (Reference 4.8.14). In this letter, the NRC states, “With respect to addressing GSI-168 for license renewal, until completion of an ongoing research program and staff evaluations, the potential issues associated with GSI-168 and their scope have not been defined to the point that a license renewal applicant can reasonably be expected to address them at this time.” GSI-168 has now been closed by issuance of NRC Regulatory Issue Summary (RIS) 2003-09, Environmental Qualification of Low-Voltage Instrumentation and Control Cables. The summary provided in RIS 2003-09 addresses the results of the technical assessment of GSI-168. This RIS states:

“Where measured environmental service conditions are less severe than those used in the original qualification and when the cables are not degraded, the licensees assessed the difference between the operating environment and the original qualification environment to extend the qualified life to 60 years by analysis. This approach based on the Arrhenius methodology, has been found acceptable by the staff during the review of license renewal applications.”

Oyster Creek is performing an analysis for all EQ related equipment and will qualify all low-voltage instrumentation and control cables for 60 years of service without lowering the original environmental service conditions. Cables that cannot be analyzed to have a qualified life of 60 years will be replaced or reanalyzed prior to the end of their qualified life. In some cases, actual cable loads will be determined and provided as a basis for reanalysis. For Oyster Creek, the EQ TLAA ensures the effects of aging will be adequately managed for the period of extended operation, per the provision of 10 CFR 54.21 (c) (1) (iii). Therefore, with respect to GSI-168, adherence to the EQ program and use of current EQ process for Oyster Creek will provide reasonable assurance through the extended period of operation that the equipment qualification will be maintained in compliance with the applicable NRC requirements.

EQ cables will be inclusive of a new inspection program, described in Section B.1.34 that will visually inspect a sample of cables and connections located in adverse localized environments for indications of accelerated age-related degradation. The scope of this program includes inspections of power, control and instrumentation cables and connections. These inspections will be performed prior to the period of extended operation, with an inspection frequency of at least once every 10 years.

Analysis

Aging evaluations of electrical components in the Oyster Creek EQ program that specify qualification of at least 40 years are TLAAs. As such, a reanalysis as described below will be applied to EQ components now qualified for the current operating term of 40 years.

Reanalysis of an aging evaluation to extend the qualification of a component is performed by reducing margin or excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component may be performed as part of the EQ program. While a component life limiting condition may be due to thermal, radiation, or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed ambient temperature of the component, unrealistically low activation energy, or in the application of a component (de-energized versus energized). The important attributes of reanalysis will include analytical methods, data collection and conservative reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met), as discussed below.

Analytical Methods

The analytical models used in the reanalysis of aging are the same as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40-year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging, a similar approach may be used. Other models may be justified on a case-by-case basis.

Data Collection and Reduction Methods

Reducing excess conservatism in the component service conditions (for example, temperature, radiation, or cycles) used in the prior aging evaluation would be the chief method used for a reanalysis. Temperature data used in an aging evaluation is to 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 (while the motor is not running). 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 are justified on a case-specific basis. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations may be used for radiation and cyclical aging.

Underlying Assumptions

EQ component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Acceptance Criteria And Corrective Actions

The reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component is maintained, replaced, or re-qualified prior to exceeding the period for which the current qualification remains valid. A reanalysis is performed in a timely manner (that is, sufficient time is available to maintain, replace, or re-qualify the component if the reanalysis is unsuccessful).

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The existing EQ program will be continued through the period of extended operation. Continuing the existing EQ program provides reasonable assurance that the aging effects will be managed and that the EQ components will continue to perform their intended functions for the period of extended operation. Refer to Environmental Qualification (EQ) of Electrical Components (B.3.2) for additional information.

4.5 LOSS OF PRESTRESS IN CONCRETE CONTAINMENT TENDONS

The Oyster Creek containment does not have pre-stressed tendons. As such, this topic is not a TLAA.

4.6 FATIGUE OF PRIMARY CONTAINMENT, ATTACHED PIPING, AND COMPONENTS

The suppression chamber assembly is often referred to as the "torus", and is used interchangeably with the phrase "suppression chamber" in the discussions that follow.

The primary containment for Oyster Creek was designed in accordance with the ASME Code, Sections VIII and IX (the latest edition at the time of the design and all applicable addenda) and Nuclear Case Interpretations 1270-N-5, 1271-N, and 1272-N-5 (Section 3.8.2.2 of Reference 4.8.2). Subsequent to design completion and start of commercial operation, new suppression chamber hydrodynamic loads were identified during industry performance of large-scale testing for the Mark III containment system and in-plant testing for Mark I primary containment systems. The "new loads" are related to the postulated loss of coolant accident (LOCA) and Electromatic Relief Valve (EMRV) operation (also referred to as "SRV" in some parts of the UFSAR). Therefore, subsequent to the original Oyster Creek containment design, the containment was reanalyzed in response to the "new loads" discoveries by General Electric and others of unevaluated loads due to design basis events and EMRV discharge. The load definitions included assumed pressure and temperature cycles resulting from EMRV discharge and design basis LOCA events. This re-evaluation was performed in two parts: generic analyses applicable to each of the several classes of BWR containments, and Mark I Containment Program plant-unique analyses (PUAs). The scope of the analyses included the pressure suppression chamber (shells and welds), the drywell-to-pressure suppression chamber vents (header and downcomers), EMRV discharge piping, other piping attached to the pressure suppression chamber, penetrations, and vent bellows. In addition, the suppression chamber and suppression chamber vents, including the vent headers and downcomers, were modified at Oyster Creek over a number of years commencing in 1975 in order to re-establish the original design safety margins when new loads were considered. The modification work was performed in accordance with several codes, including ASME Code Section III, Subsection NE, "Class MC Components," 1977 Edition through Summer 1977 Addenda (Section 3.8.2.2 of Reference 4.8.2). Finally, the PUA for Oyster Creek was updated in 1994 (Reference 4.8.15) to accommodate an increased EMRV setpoint pressure.

Drywell shell plates were not evaluated for fatigue in the original design, and the PUA did not re-evaluate the drywell, drywell penetrations, or process penetration bellows, all of which are attached to the drywell. However, the licensing and design basis documents do reflect the structural evaluation of drywell wall thinning at various locations in 1986 and 1987. In addition, the drywell process bellows were specified for a finite number of operating cycles, as were replacement bellows.

Containment fatigue analyses are presented for the following groups:

- Fatigue Analysis of Primary Containment System
(Includes Suppression Chamber, Vents, Vent Headers, and Downcomers, EMRV Discharge Piping Inside the Suppression Chamber, External Suppression Chamber Attached Piping, Associated Penetrations, and Drywell-to-Suppression Chamber Vent Line Bellows)
- Primary Containment Process Penetration and Bellows Fatigue Analysis

4.6.1 FATIGUE ANALYSIS OF THE PRIMARY CONTAINMENT SYSTEM (INCLUDES SUPPRESSION CHAMBER, VENTS, VENT HEADERS, AND DOWNCOMERS, EMRV DISCHARGE PIPING INSIDE THE SUPPRESSION CHAMBER, EXTERNAL SUPPRESSION CHAMBER ATTACHED PIPING, ASSOCIATED PENETRATIONS, AND DRYWELL-TO-SUPPRESSION CHAMBER VENT LINE BELLOWS)

Summary Description

There are five safety relief valves (EMRVs) installed in the Oyster Creek main steam system. When opened, steam discharges from each EMRV through piping routed through the drywell to the suppression chamber. The EMRV discharge piping enters the suppression chamber through penetrations on the suppression chamber vent header where the steam is discharged to the suppression chamber water through a quencher attached to the suppression chamber. Additionally, there are a number of external piping systems attached to the suppression chamber shell.

Mark I containment designs include a drywell-to-suppression chamber vent line. A bellows assembly is provided at the penetration of the vent line to the suppression chamber. The bellows allows differential movement of the vent system and suppression chamber to occur without developing significant interaction loads.

New hydrodynamic loads were identified subsequent to the original design for the containment suppression chamber vents. These additional loads result from blowdown into the suppression chamber during a postulated loss-of-coolant accident (LOCA) and during EMRV operation during plant transients. The results of analyses of these effects are presented in the latest Oyster Creek Plant Unique Analysis Report (PUAR) (Reference 4.8.15). The PUAR describes the fatigue analyses of EMRV discharge lines, Y-quenchers, the EMRV discharge line penetrations through the vent lines, suppression chamber shell (torus) attached piping (TAP) systems, and the associated penetrations. These analyses assume a limited number of EMRV actuations throughout the 40-year life of the plant and are therefore TLAAs.

Analysis

For Oyster Creek, the current design basis analyses assumed 450 EMRV actuations of all five EMRVs simultaneously during the normal operating condition (NOC), plus 20 cycles for an intermediate-break accident (IBA) or 20 cycles for a small-break accident (SBA) or 1 cycle for a design basis accident (DBA), whichever was more bounding. In addition, it was assumed that each

EMRV "actuation" results in one thermal, one pressure, and five dynamic load cycles. The design basis also included an Operating Basis Earthquake (OBE), which was assumed equivalent to 10 EMRV cycles (Reference 4.8.16).

Table 4.6.1-1 summarizes the design basis fatigue cumulative usage factor (CUF) values from the analyses described above. A summary of the major primary containment areas follows.

Suppression Chamber Shell and Associated Welds

For the suppression chamber shell and associated welds including MC supports, the limiting analysis involves 1 DBA event rather the 20 cycles for an IBA or SBA event. NOC + (DBA + OBE) was the limiting case, and the worst-location fatigue CUF was 0.706 for the shell. The (DBA + OBE) event was the most significant contributor to the fatigue CUF.

Suppression Chamber Vent Headers, Downcomers, and Associated Welds

NOC + (DBA + OBE) was the limiting case, for which the worst-location fatigue CUF was 0.896 for the vent headers (at the intersection with the downcomers). The contribution of the EMRV discharge loads to the fatigue CUF of the vent headers was small (~0.118).

Drywell-to-Suppression Chamber Vent Line Bellows

Fatigue analysis of the drywell-to-suppression chamber vent line bellows demonstrates their adequacy to accommodate thermal and internal pressure load cycles for the life of the plant with a very low CUF (0.027).

External TAP and Nozzles

The torus attached piping (TAP) and associated nozzles in the suppression chamber are covered by fatigue analyses. The analyses concluded that the nozzles and TAP would have limiting fatigue CUFs of 0.9 and 0.434, respectively, at the end of 40 years of operation.

EMRV Discharge Line-Vent Line Penetrations

Fatigue analyses of the EMRV piping penetrations on the vent pipes show that the maximum CUF for these components is 0.492. The (DBA + OBE) event was the largest contributor to the fatigue CUF.

For all primary containment system components the majority of the CUF is caused by (DBA + OBE) accident loading, which is not expected to occur. The contribution to CUF by EMRV Actuations is small, and will remain small for the number of events anticipated for the 60-year life of the plant. Because the projected number of actual events for 60 years of operation is less than the number assumed in the design basis (40-year) analysis, the design basis analysis remains bounding for the period of extended operation. Therefore, CUFs for these locations are expected to remain below the allowable value of 1.0 for the 60-year life of the plant. Monitoring of these locations in the Metal Fatigue of

Reactor Coolant Pressure Boundary (B.3.1) aging management program will verify this assumption.

Table 4.6.1-1
Summary of CUFs for Oyster Creek Primary Containment System

Location	Original Design Basis CUF (Note 1)
Downcomer/Vent Header Intersection	0.896
Vent Line/Drywell Intersection	0.524
Torus Shell	0.706
Saddle Top Flange	0.068
Ring Girders Not Supporting EMRV Lines	0.139
Bellows	0.027
Torus Shell at EMRV-Supporting Ring Girder	0.683
EMRV-Supporting Ring Girders	0.683
EMRV Piping Penetration On Vent Pipe	0.492
Vent Header Ring Collar	0.51
Torus Support Columns and Sway Braces	0.37
Nozzle: Drywell to Torus Vacuum Relief (Vent Line End)	0.548
Nozzle: Drywell to Torus Vacuum Relief (Torus End)	0.9
Nozzle: Core Spray Suction Header	0.862
Nozzle: Demineralizer Relief	0.455
Nozzle: Test Return Line	0.668
Attached Piping: Vacuum Relief	0.434
Attached Piping: Demineralizer	0.087
Attached Piping: Core Spray Suction	0.131

Note:

1. Because the projected number of actual events for 60 years of operation is less than the number assumed in the design basis (40-year) analysis, the design basis analysis remains bounding for the period of extended operation.

Disposition: Validation, 10 CFR 54.21(c)(1)(i) and Aging Management, 10 CFR 54.21(c)(1)(iii)

Based on review of past plant operation, there have been a total of 129 or fewer actuations for any individual EMRV from initial operation (December 1969) through January 2004 (1/1/04). Based on trending of events over the most recent 10 years of plant operation, there has been an accumulation rate of 2.35 EMRV lifts per year. Therefore, for the extended period of operation (60 years), the total number of expected EMRV lifts for the limiting EMRV would be approximately 129 lifts + (2.35 lifts/year x 25.27 years) = 188 lifts. This projected 60-year cycle count is within the 450 lifts assumed in the design evaluation for the primary containment components. Therefore, the design analysis remains acceptable for the extended period of operation.

Even though the projected number of cycles is projected to be within the original design assumption, all relevant plant transient events will be tracked to ensure that the CUF remains less than 1.0 for all monitored components. Validation for primary containment locations will be performed by monitoring the high-usage-factor locations in the limiting containment locations. All governing fatigue analyses have been reviewed to establish a comprehensive and bounding set of Primary Containment locations for inclusion in the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program.

Bounding locations with design basis CUFs that exceed 0.4 in Table 4.6.1-1 will be included in the program. These locations are listed in Table 4.6.1-2. Since the projected number of events for 60 years do not exceed those assumed in the design basis analysis, the CUF listed in Table 4.6.1-2 for a component is the same as that in Table 4.6.1-1. EMRV lifts will be monitored to ensure that the CUFs remain less than 1.0. For the primary containment, this program will monitor CUFs through Cycle-Based Fatigue (CBF) Monitoring.

For locations with a CUF less than 0.4 in Table 4.6.1-1, a 20-year increase in service life will not raise the usage factor significantly close to the allowable value of 1.0. Therefore, these locations are not included in the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program.

In the event fatigue usage for any component is predicted to exceed 1.0 as a result of monitoring prior to 60 years of operation, appropriate corrective action will be taken in accordance with the corrective action process. The required implementing actions will be completed prior to the period of extended operation.

Table 4.6.1-2
Fatigue Monitoring Locations for Primary Containment Components

Primary Containment Location	Design Analysis CUF (Note 1)
Downcomer/Vent Header Intersection	0.896
Vent Line/Drywell Intersection	0.524
Torus Shell	0.706
Torus Shell at SRV-Supporting Ring Girder	0.683
EMRV Supporting Ring Girders	0.683
EMRV Piping Penetration On Vent Pipe	0.492
Vent Header Ring Collar	0.51
Nozzle: Drywell to Torus Vacuum Relief (Torus End)	0.9 (see Note 2)
Attached Piping: Vacuum Relief	0.434

Notes:

1. Since the number of EMRV actuations is less than assumed in the design fatigue analysis, these design basis CUF values remain bounding for 60 years of plant operation.
2. All the nozzles were analyzed for the same loads so only the nozzle with the highest usage was selected as representative and bounding for fatigue monitoring purposes.

4.6.2 PRIMARY CONTAINMENT PROCESS PENETRATIONS AND BELLOWS FATIGUE ANALYSIS

Summary Description

Containment pipe penetrations must accommodate thermal movement during normal plant operation and transients. Some of the piping penetrations have bellows to help accommodate expansion from differential thermal growth. The penetrations and bellows are designed for a minimum number of operating thermal cycles over the design life of the plant at normal, test, and limiting design containment pressures. These analyses also assume a limited number of thermal cycles throughout the 40-year life for the plant and are therefore TLAAs.

Analysis

Evaluation of the containment penetrations was performed in accordance with the cyclic exclusion criteria of ASME Code Section III, Subsection NE-3221.5(d) (Reference 4.8.17). The limiting containment penetrations have been evaluated for thermal cycles as summarized in Table 4.6.2-1 (Reference 4.8.18).

Two of the containment penetrations (main steam and feedwater) also have bellows to help accommodate thermal expansion. The containment process line bellows are designed for 7000 cycles. The evaluation of the process line bellows for thermal cycles is also summarized in Table 4.6.2-1.

Disposition: Validation, 10 CFR 54.21(c)(1)(i) and Aging Management, 10 CFR 54.21(c)(1)(iii)

The governing fatigue analyses have been reviewed to establish a comprehensive and bounding set of penetration results for evaluation of fatigue effects in the license renewal period. The results of the penetration analyses are summarized in Table 4.6.2-1.

For the 60-year extended operating period, the expected number of relevant thermal cycles for each penetration are shown in Table 4.6.2-1. For all of the penetrations, the 60-year number of cycles is projected to be less than the number of cycles evaluated in the design basis fatigue exemption analyses. Thus, the 60-year cycle counts continue to permit the fatigue exemption requirements of ASME Code Section III, Subsection NE to be met for a 60-year operating period.

The feedwater and main steam penetrations bellows is also included in Table 4.6.2-1. The number of relevant cycles anticipated for the 60-year extended period of operation is considerably less than the 7000 allowed cycles for each penetration.

As additional assurance that these requirements will continue to be met, the bounding (Isolation Condenser) penetration will be included in the Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) aging management program. All necessary plant transient events will be tracked to ensure that the number of actual cycles remains less than the number assumed in the design basis for this monitored penetration. In the event the actual number of cycles is predicted to exceed the analyzed number of cycles prior to 60 years of operation, appropriate corrective action will be taken in accordance with the corrective action process), including expansion of the program to include other penetration locations, if deemed appropriate. The required implementing actions will be completed prior to the period of extended operation.

Table 4.6.2-1
Summary of Primary Containment Process Penetrations and Bellows Analysis

PENETRATIONS	60-Year Projected Number of Cycles	Allowed Number of Cycles
Isolation Condenser Penetrations (X-5A/B) (Note 1)	530	2050
Reactor Water Cleanup (RWCU) Demineralizer Penetration (X-10) (Note 1)	282	2050
Shutdown Cooling Penetration (X-7)	248	5,000
Main Steam Penetrations (X-2A/B)	284	3,714
Control Rod Drive (CRD) Scram Discharge Hydraulic Penetrations (X-13A/B) - Stainless Steel Material - Carbon Steel Material	 155 155	 3,260 13,913
BELLOWS		
Main Steam	284	7,000
Feedwater	295	7,000

Note:

1. These penetrations were replaced in 1992. They are designed for a minimum of 40 years. However, the cycle counts shown for these penetrations conservatively reflect the entire operating time for the plant to-date.

4.7 OTHER PLANT-SPECIFIC TIME LIMITED AGING ANALYSES

4.7.1 CRANE LOAD CYCLE LIMIT

Summary Description

The load cycle limits for cranes was identified as a potential TLAA. The following Oyster Creel Nuclear Generating Station cranes are in the scope of License Renewal and have been identified as having a TLAA, which requires evaluation for 60 years:

- Reactor Building Crane
- Turbine Crane
- Heater Bay Crane

The method of review applicable to the crane cyclic load limit TLAA involves (1) reviewing the existing 40-year design basis to determine the number of load cycles considered in the design of each of the cranes in the scope of License Renewal, (2) developing 60-year projections for load cycles for each of the cranes in the scope of License Renewal and compare with the number of design cycles for 40 years.

Analysis

4.7.1.1 Reactor Building Crane

The 105-ton Reactor Building Crane at Oyster Creek is designed to meet or exceed the design fatigue requirements of the Crane Manufacturers Association of America (CMAA) Specification 70, Class AI. This evaluation of cycles over the 40-year life is the basis of a safety determination and is therefore a TLAA Analysis.

The Reactor Building Crane is designed in accordance with CMAA Specification 70, service Class A1. The crane was therefore designed for 20,000 to 100,000 load cycles. A review of Reactor Building crane operation during the current life of the plant indicates that the total number of lifts above 25 tons to date is less than 1200. The total number of lifts has been conservatively estimated to be less than 2800 for the total life of plant, including the extended period of operation associated with license renewal and removal of spent fuel for the spent fuel storage pool. This is considerably less than the allowable design value of 20,000 to 100,000 cycles and is therefore acceptable. Therefore, the Reactor Building Crane load cycle fatigue analysis has been successfully projected for 60 years of plant operation. (Reference 4.8.19).

4.7.1.2 Turbine Building Crane

The Oyster Creek 150-ton Turbine Building Crane purchasing specification required that the crane conform to the latest edition of CMAA, Specification 70 for Electric Overhead Traveling Cranes, Service Class A. The crane was therefore designed for 20,000 to 100,000 load cycles.

The number of lifts originally for 40 years is projected to be less than 1250. This can be multiplied by a factor of 1.5 to determine the number of cycles for 60-year life. Therefore, the number of load cycles projected for 60-year life is less than 2000. This is less than the 20,000 to 100,000 permissible cycles and is therefore acceptable. Therefore, the Turbine Building Crane load cycle fatigue analysis has been successfully projected for 60 years of plant operation.

4.7.1.3 Heater Bay Crane

The Oyster Creek 25-ton Heater Bay Crane purchasing specification required that the crane conform to the latest edition of The Electric Overhead Crane Institute Specification #61. The crane was therefore designed for 20,000 to 100,000 load cycles.

The number of lifts originally for 40 years is projected to be less than 400. This can be multiplied by a factor of 1.5 to determine the number of cycles for 60-year life. Therefore, the number of load cycles projected for 60-year life is less than 600. This is less than the 20,000 to 100,000 permissible cycles and is therefore acceptable. Therefore, the Heater Bay Crane fatigue analysis has been successfully projected for 60 years of plant operation.

Disposition: Validation, 10 CFR 54.21(c)(1)(ii)

Based on the above information, the analyses associated with The Reactor Building Crane, Turbine Building Crane, and the Heater Bay Crane have been successfully projected to the end of the period of extended operation.

4.7.2 DRYWELL CORROSION

Summary Description

The Mark I containment design includes an annulus (expansion gap) between the containment and the primary containment shield wall. The potential for degradation of the containment exists due to conditions that allow the introduction of water into the annulus. This potential for corrosion was first recognized when water was noticed coming from the sand bed drains in 1980. Corrosion was later confirmed by ultrasonic thickness measurements taken in 1986.

Corrective action included establishing a minimum shell thickness. This was accomplished by demonstrating through analysis that the original drywell design pressure was conservative. The plant Technical Specifications were amended to reduce the drywell design pressure from 62 psig to 44 psig (Reference 4.8.20). The new design pressure coupled with the measures to prevent water intrusion in the gap between the containment vessel and the shield wall concrete allow the drywell vessel to meet ASME code for the remaining 40-year life of the plant. Analysis of the minimum wall thickness of the containment vessel satisfies the criteria of 10 CFR 54.3(a) and is thus a TLAA.

Analysis

Several corrective actions have been taken to ensure minimum wall thicknesses are maintained, including removal of sand from the sand bed region to break up galvanic action, removal of the corrosion product from the containment vessel, and application of a protective coating. Additionally Oyster Creek performs a monitoring program to ensure corrosion mitigation measures are effective and the required minimum wall thickness is maintained.

The Oyster Creek ASME Section XI, Subsection IWE aging management program (B.1.27) ensures that the reduction in vessel thickness will not adversely affect the ability of the drywell to perform its safety function. The ASME Section XI, Subsection IWE aging management program:

- Performs Periodic UT inspections at critical locations,
- Performs calculations to track corrosion rates,
- Projects vessel thickness based on conservatives corrosion rates, and
- Demonstrates that the minimum required vessel thickness is maintained.

Inspections conducted since 1992 demonstrate that as a result of corrective actions the corrosion rates are very low or in some cases have been arrested. The drywell surfaces that were coated do not show signs of or deterioration. Drywell vessel wall thickness measurements indicate there is substantial margin to the minimum wall thickness, even when projected to the year 2029 using conservative estimates of the corrosion rates. Continued assessment of the observed drywell vessel thickness ensures that timely action can be taken to correct degradation that could lead to loss of the intended function. Additional information is provided in Reference 4.8.21.

Disposition: 10 CFR 54.21(c)(1)(iii)

The Oyster Creek ASME Section XI, Subsection IWE aging management program assures that the Oyster Creek drywell vessel thickness will not be reduced to less than the minimum required value in any future operation. Therefore, the effects of loss of material on the intended function of the Drywell will be adequately managed in accordance with 10 CFR 54.21(c)(1)(iii) for period of extended operation.

4.7.3 EQUIPMENT POOL AND REACTOR CAVITY WALLS REBAR CORROSION

Summary Description

In a letter to the NRC discussing drywell corrosion, it was reported that leakage was observed in the vicinity of the equipment pool and reactor cavity walls, indicating slight corrosion of the reinforcing bar (Reference 4.8.26). Based on a representative concrete core sample, it was conservatively estimated that the diameter of a typical reinforcing rebar in the localized area could be expected to be reduced by 0.002 inch/year. The walls in question are reinforced with #8 and #11 rebar. Assuming the corrosion continues for the entire 40-year life of the plant the diameter of the reinforcing bar would be reduced by 8% and 6% respectively. The corrosion was localized and the reduced reinforcing bar diameter was judged to have no impact on the concrete integrity.

Analysis

The equipment pool and reactor cavity walls were recently visually inspected. The walls indicated no signs of water intrusion. No indications of further deterioration were observed. Conservatively assuming the above corrosion rates continue for the end of the period of extended operation, the diameter of the #8 and #11 reinforcing bar are estimated to reduce by 12% and 9%, respectively. Since the corrosion continues to be localized there is no significant impact on the integrity of the concrete.

Disposition: 10 CFR 54.21(c)(1)(ii)

The corrosion of the reinforcing bar has been projected to end of the period of extended operation. The integrity of the concrete will be maintained even if the reinforcing bar corrosion continues to the end of the period of extended operation.

4.7.4 REACTOR VESSEL WELD FLAW EVALUATIONS

Summary Description

In the Inservice inspection report for the Section XI inspections performed in 2000 the NRC was informed of flaws that were detected in two vertical reactor vessel welds (Reference 4.8.28). These flaws were evaluated and found acceptable in accordance with ASME Section XI, IWB-3600. The flaw evaluations were based on conditions valid for the current life of the plant, including fluence at 32 EFPY, thermal transients, and existing P-T curves. Because the flaw evaluations are only valid for the current 40 year life of the plant, the flaw evaluations satisfy the criteria of 10 CFR 54.3(a) and are TLAAs.

Analysis

These flaws have been reevaluated for the conditions at the end of the proposed period of extended operation, including fluence for 50 EFPY. The existing flaws were found to be acceptable in accordance with ASME Section XI, IWB-3600 for the period of extended operation.

Disposition: 10 CFR 54.21(c)(1)(ii)

The flaw evaluations associated with reactor vessel axial weld have been projected to be acceptable to the end of the period of extended operation.

4.7.5 CRD STUB TUBE FLAW ANALYSIS

Summary Description

In Amendment 37 to the Oyster Creek provisional operating license application, information was provided to the Atomic Energy Commission regarding repair of cracks that were discovered in the CRD stub tubes during construction. The proposed repair included grinding out of the observed cracks and applying a weld overlay. In support of the proposed repair an analysis was performed to demonstrate that, if an undetected crack were still to exist after the repairs, it would not grow through the overlay during the life of the plant. According to Amendment 37 the analysis indicated that more that 1000 startup and shutdown cycles would be required to grow the postulated crack through the clad overlay. At the time the Amendment 37 was performed the design number of startups and shutdowns assumed for design analyses was 120. Therefore, it was concluded that any crack not detected by the pre-cladding inspection would not propagate to the surface during the reactor lifetime.

The evaluation of the postulated flaw is analyzed for the 40 year life of the plant and meets the criteria of 10 CFR 54.3(a) for a TLAA.

Analysis

The analysis of the postulated undetected flaw described in Amendment 37 states that it would require more than 1000 startup and shutdown cycles to propagate the flaw to the surface, potentially leading to coolant leakage. The projected number of startup and shutdown cycles at the end of the period of extended operation is less than 275 (see Table 4.3.1-1). Therefore the flaw evaluation described in Amendment 37 is valid for the period of extended operation.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The number of startup and shutdown cycles to the end of the evaluation period will remain less than the 1000 cycles assumed in the analysis of the postulated flaw, therefore the evaluation remains valid for license renewal.

4.8 REFERENCES

4.8.1 TransWare Enterprises Inc. Document No. EXL-FLU-001-R-002, Revision 0, "Fluence Evaluation for Oyster Creek Reactor Pressure Vessel.", March 2005.

4.8.2 *Oyster Creek Nuclear Generating Station Updated Final Safety Analysis Report,* Revision 13, AmerGen/Exelon, April 2003. Cited throughout this section as "Oyster Creek UFSAR."

4.8.3 Safety Evaluation Report, "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report (TAC No. M93925)," Office of Nuclear Reactor Regulation, May, 1998.

4.8.4 BWRVIP-05, EPRI Report TR-105697, *BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05).* For the Boiling Water Reactor Owners Group (Proprietary), September 28, 1995, with supplementing letters of June 24 and October 29, 1996, May 16, June 4, June 13, and December 18, 1997, and January 13, 1998. Cited by the SRP-LR [NUREG 1800] as Section 4.2 of Reference 4.8.8 (EPRI Proprietary Information)

4.8.5 USNRC Safety Evaluation by the Office of Nuclear Reactor Regulations, Inservice Inspection Program, Relief Request R17, Revision 1, Oyster Creek Nuclear Generating Station, Amergen Energy Company, LLC, Docket No. 52-219, (TAC No, MB2940), July 11, 2002.

4.8.6 Structural Integrity Associates Report No. SIR-00-063, Revision 0, "Oyster Creek Nuclear Generating Station Reactor Pressure Vessel Material Evaluation and Estimation of Reference Temperatures for Use in Flaw Evaluation," June 2000.

4.8.7 BWRVIP-05 SER (Final), USNRC letter from Gus C. Lainas to Carl Terry, Niagara Mohawk Power Company, BWRVIP Chairman, "Final Safety Evaluation of the BWR Vessel and Internals Project BWRVIP-05 Report," (TAC No. M93925), July 28, 1998.

4.8.8 BWRVIP-05 SER (Supplement), USNRC letter from Jack R. Strosnider, Jr., to Carl Terry, BWRVIP Chairman, "Supplement to Final Safety Evaluation of the BWRVIP Vessel and Internals Project BWRVIP-05 Report," (TAC No. MA3395), March 7, 2000.

4.8.9 "Safety Evaluation Regarding the Oyster Creek Core Shroud Repair (TAC No. M90104)," attached to a letter from Phillip F. McKee (USNRC) to John J. Barton (GPU Nuclear Corporation), November 25, 1994.

4.8.10 Title 10 US Code, Part 50, Section 49 (10 CFR 50.49), "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants."

4.8.11 Regulatory Guide 1.89, Revision 1, "Environmental Qualification of Certain Electrical Equipment Important to Safety for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, June 1984.

4.8.12 DOR Guidelines, "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," U.S. Nuclear Regulatory Commission, June 1979.

4.8.13 NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety Related Electrical Equipment," U.S. Nuclear Regulatory Commission, July 1981.

4.8.14 C.I. Grimes (NRC) letter to D. Walters (NEI), "Guidance on Addressing GSI-168 for License Renewal," Project 690, June 1998.

4.8.15 MPR-1434, Revision 0, "Oyster Creek Nuclear Generating Station Evaluation of Proposed Increase in Technical Specification Limits for EMRV Setpoint Pressure on Mark I Containment Long-Term Program Analyses," March 1994.

4.8.16 MPR-724, "Oyster Creek Nuclear Generating Station Mark I Containment Long-Term Program, Torus and Vent System Fatigue Methods," October 1982.

4.8.17 "Oyster Creek Nuclear Generating Station SEP Topic III-7B, 'Design Codes, Design Criteria, Load Combinations, and Reactor Cavity Design Criteria (TAC No. 76879)," attached to a letter from Alexander W. Dromerick (USNRC) to John J. Barton (GPU Nuclear Corporation), February 20, 1991.

4.8.18 GPU Nuclear Calculation No. C-1302-243-5320-042, Revision 2, "O.C. SEP Topic III.7.B Penetration Fatigue," 8/21/90 (Listed as Reference 9 in the Reference 4.8.17 document). MPR-1175, "Oyster Creek Nuclear Generating Station Reactor Water Cleanup Drywell Penetration Flued Collar Stress Analysis", April 1990. MPR-1176, Oyster Creek Nuclear Generating Station Isolation Condenser Penetration Flued Collar Stress Analysis", April 1990.

4.8.19 AmerGen Letter to the NRC, 2130-01-20211, TSCR 281, Response to Request for Additional Information, October 12, 2001.

4.8.20 NRC SER for License Amendment No. 165, dated September 13, 1993.

4.8.21 Letter, GPUN to NRC, "Drywell Corrosion Monitoring Program, Dated September 15, 1995.

4.8.22 Letter dated September 10, 1998,from GPUN to USNRC, " response to Request for Additional Information(RAI) Regarding Reactor Pressure Vessel Integrity at Oyster Creek Nuclear Generating Station(OCNGS)," 1940-98-20489.

4.8.23 Letter dated June 3, 2002 from AmerGen to the USNRC, " ASME XI Relief Request R17, Revision 1, Response to request for Additional Information".

4.8.24 BWRVIP-74, EPRI Report TR 113596, *BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines (BWRVIP 74)*. General Electric, for the Boiling Water Reactor Owners Group and EPRI (Proprietary). With Appendix A, "Demonstration of Compliance with the Technical Information Requirements of the License Renewal Rule (10 CFR Part 54.21)." Approved by SER of October 18, 2001 [Ref.4.25].

4.8.25 BWRVIP-74 SER, USNRC Final License Renewal Safety Evaluation Report of EPRI Proprietary Report TR 113596, "BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines (BWRVIP 74)," and Compliance with the License Renewal Rule (10 CFR Part 54). Attached to a letter from Christopher I. Grimes, USNRC License Renewal and Standardization Branch, to Carl Terry, BWRVIP Chairman, "Acceptance for Referencing of EPRI Proprietary Report TR 113596, 'BWR Vessel and Internals Project, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines (BWRVIP 74),' and Appendix A, 'Demonstration of Compliance with the Technical Information Requirements of the License Renewal Rule (10 CFR Part 54.21),'" October 18, 2001.

4.8.26 Letter dated December 5, 1990, from GPUN to USNRC, " Oyster Creek Drywell Containment", 5000-90-1995.

4.8.27 USNRC Safety Evaluation by the Office of Nuclear Reactor Regulations, Inservice Inspection Program, Relief Request R18, Oyster Creek Nuclear Generating Station, Amergen Energy Company, LLC, Docket No. 52-219, (TAC No, MA8016), September 14, 2000.

4.8.28 Letter to the USNRC, dated February 13, 2001, " Inservice Inspection Data Reports", GPUN letter 2130-01-20039.

APPENDIX A FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

TABLE OF CONTENTS

A.0 INTRODUCTION

The application for a renewed operating license is required by 10 CFR 54.21(d) to include a FSAR Supplement. This appendix, which includes the following sections, comprises the FSAR supplement:

- Sections A.0.1 contains a listing of the aging management programs that correspond to NUREG-1801 programs, including the status of the program at the time the License Renewal Application was submitted.
- Sections A.0.2 contains a listing of the plant specific aging management programs, including the status of the program at the time the License Renewal Application was submitted.
- Sections A.0.3 contains a listing of the time-limited aging analysis aging management programs, including the status of the program at the time the License Renewal Application was submitted.
- Section A.1 contains a summarized description of the NUREG-1801 programs for managing the effects of aging.
- Section A.2 contains a summarized description of the plant specific programs for managing the effects of aging.
- Section A.3 contains a summarized description of the NUREG-1801 programs that support the TLAAs.
- Section A.4 contains a summarized description of the Time-Limited Aging Analyses (TLAAs) applicable to the period of extended operation.
- Section A.5 contains the License Renewal Commitment List

The integrated plant assessment for license renewal identified new and existing aging management programs necessary to provide reasonable assurance that systems, structures, and components within the scope of license renewal will continue to perform their intended functions consistent with the Current Licensing Basis (CLB) for the period of extended operation. The period of extended operation is defined as 20 years from the unit's current operating license expiration date.

A.0.1 NUREG-1801 AGING MANAGEMENT PROGRAMS

The NUREG-1801 Aging Management Programs (AMPs) are described in the following sections. The AMPs are either consistent with generally accepted industry methods as discussed in NUREG-1801 or require enhancements.

The following list reflects the status of these programs at the time of the License Renewal Application (LRA) submittal. Commitments for program additions and enhancements are identified in the appropriate sections.

1. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (Section A.1.1) [Existing – Requires Enhancement]

2. Water Chemistry (Section A.1.2) [Existing]

3. Reactor Head Closure Studs (Section A.1.3) [Existing]

4. BWR Vessel ID Attachment Welds (Section A.1.4) [Existing]

5. BWR Feedwater Nozzle (Section A.1.5) [Existing]

6. BWR Control Rod Drive Return Line Nozzle (Section A.1.6) [Existing]

7. BWR Stress Corrosion Cracking (Section A.1.7) [Existing]

8. BWR Penetrations (Section A.1.8) [Existing]

9. BWR Vessel Internals (Section A.1.9) [Existing – Requires Enhancement]

10. Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (Section A.1.10) [New]

11. Flow-Accelerated Corrosion (Section A.1.11) [Existing]

12. Bolting Integrity (Section A.1.12) [Existing]

13. Open-Cycle Cooling Water System (Section A.1.13) [Existing]

14. Closed-Cycle Cooling Water System (Section A.1.14) [Existing – Requires Enhancement]

15. Boraflex Rack Management Program (Section A.1.15) [Existing]

16. Inspection of Overhead Heavy Load and Light Load Related to Refueling) Handling Systems (Section A.1.16) [Existing – Requires Enhancement]

17. Compressed Air Monitoring (Section A.1.17) [Existing]

18. BWR Reactor Water Cleanup System (Section A.1.18) [Existing]

19. Fire Protection (Section A.1.19) [Existing – Requires Enhancement]

20. Fire Water System (Section A.1.20) [Existing – Requires Enhancement]

21. Aboveground Outdoor Tanks (Section A.1.21) [New]

22. Fuel Oil Chemistry (Section A.1.22) [Existing – Requires Enhancement]

23. Reactor Vessel Surveillance (Section A.1.23) [Existing – Requires Enhancement]

24. One-Time Inspection (Section A.1.24) [New]

25. Selective Leaching of Materials (Section A.1.25) [New]

26. Buried Piping Inspection (Section A.1.26) [Existing – Requires Enhancement]

27. ASME Section XI, Subsection IWE (Section A.1.27) [Existing]

28. ASME Section XI, Subsection IWF (Section A.1.28) [Existing – Requires Enhancement]
29. 10 CFR Part 50, Appendix J (Section A.1.29) [Existing]
30. Masonry Wall Program (Section A.1.30) [Existing]
31. Structures Monitoring Program (Section A.1.31) [Existing – Requires Enhancement]
32. RG 1.127, Inspection of Water-Control Structures associated With Nuclear Power Plants (Section A.1.32) [Existing – Requires Enhancement]
33. Protective Coating Monitoring and Maintenance Program (Section A.1.33) [Existing]
34. Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.1.34) [New]
35. Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (Section A.1.35) [Existing – Requires Enhancement]
36. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section A.1.36) [New]

A.0.2 PLANT SPECIFIC AGING MANAGEMENT PROGRAMS

The plant specific programs are described in the following sections. The following list reflects the status of these programs at the time of the License Renewal Application (LRA) submittal. Commitments for program additions and enhancements are identified in the appropriate sections.

1. Periodic Testing of Containment Spray Nozzles (Section A.2.1) [Existing]
2. Lubricating Oil Monitoring Activities (Section A.2.2) [Existing – Requires Enhancement]
3. Generator Stator Water Chemistry Activities (Section A.2.3) [Existing]
4. Periodic Inspection of Ventilation Systems (Section A.2.4) [Existing – Requires Enhancement]
5. Periodic Inspection Program (Section A.2.5) [New]
6. Wooden Utility Poles Program (Section A.2.6) [New]
7. Periodic Monitoring of Combustion Turbine Power Plant [Existing]

A.0.3 TIME-LIMITED AGING ANALYSES AGING MANAGEMENT PROGRAMS

The NUREG-1801 Time-Limited Aging Analyses AMPs are described in the following sections. The AMPs are either consistent with generally accepted industry methods as discussed in NUREG-1801 or require enhancements. The following list reflects the status of these programs at the time of the License Renewal Application (LRA) submittal. Commitments for program additions and enhancements are identified in the appropriate sections.

1. Metal Fatigue of Reactor Coolant Pressure Boundary (Section A.3.1) [Existing – Requires Enhancement]

2. Environmental Qualification (EQ) Program (Section A.3.2) [Existing]

A.0.4 TIME-LIMITED AGING ANALYSIS SUMMARY

Summaries of the Time-Limited Aging Analyses applicable to the period of extended operation are included in the following sections.

1. Neutron Embrittlement of the Reactor Vessel and Internals (Section A.4.1)

2. Metal Fatigue of the Reactor Vessel, Internals, and Primary Coolant Boundary Piping and Components (Section A.4.2)

3. Environmental Qualification of Electrical Equipment (EQ) (Section A.4.3)

4. Fatigue of Primary Containment, Attached Piping, and Components (Section A.4.4)

5. Other Plant-Specific TLAAs (Section A.4.5)

A.0.5 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, and is consistent with the summary in Appendix A.2, "Quality Assurance For Aging Management Programs (Branch Technical Position IQMB-1)" of NUREG-1800. The Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls, and these elements are applicable to the safety-related and non-safety related systems, structures, and components (SSCs) that are subject to Aging Management Review (AMR). In many cases, existing activities were found adequate for managing aging effects during the period of extended operation.

A.1 <u>NUREG-1801 AGING MANAGEMENT PROGRAMS</u>

This section provides summaries of the NUREG-1801 programs credited for managing the effects of aging.

A.1.1 ASME SECTION XI INSERVICE INSPECTION, SUBSECTIONS IWB, IWC, AND IWD

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program is an existing program that consists of periodic volumetric and visual examinations of components for assessment, identification of signs of degradation, and establishment of corrective actions. The inspections will be implemented in accordance with 10 CFR 50.55(a).

For the isolation condensers this program also includes enhancement activities identified in NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” lines IV.C1-5 and IV.C1-6. These are new activities in addition to those required by ASME Section XI, Subsections IWB, IWC, and IWD. The isolation condenser test and inspection enhancement activities detect cracking due to stress corrosion cracking or intergranular stress corrosion cracking, and detect loss of material due to general, pitting and crevice corrosion. These enhancement activities verify that significant degradation is not occurring, and therefore that the intended function of the isolation condenser is maintained during the extended period of operation. These enhancement activities consist of temperature and radioactivity monitoring of the shell side water, which will be implemented prior to the period of extended operation, and eddy current testing of the tubes, with inspection (VT or UT) of the tubesheet and channel head, which will be performed during the first ten years of the extended period of operation.

These activities include inspections, and monitoring and trending of results to confirm that again effects are managed.

A.1.2 WATER CHEMISTRY

The Water Chemistry aging management program is an existing program whose activities consist of monitoring and control of water chemistry to manage the aging of piping, piping components, piping elements and heat exchangers that are exposed to treated water to keep peak levels of various contaminants below system-specific limits based on industry-recognized guidelines of BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines” for the prevention or mitigation of loss of material, reduction of heat transfer and cracking aging effects. In addition, the water chemistry program is also credited for mitigating loss of material and cracking for components exposed to sodium pentaborate and boiler treated water environments. To mitigate aging effects on component surfaces the chemistry program are used to control water chemistry for impurities that accelerate corrosion.

A.1.3 REACTOR HEAD CLOSURE STUDS

The Reactor Head Closure Studs aging management program is an existing program that provides for condition monitoring and preventive activities to manage stud cracking. The program is implemented through station procedures based on the examination and inspection requirements specified in ASME Section XI, Table IWB-2500-1 and preventive measures described in Regulatory Guide 1.65, “Materials and Inspection for Reactor Vessel Closure Studs.”

A.1.4 BWR VESSEL ID ATTACHMENT WELDS

The BWR Vessel ID Attachment Welds aging management program is an existing program that includes (a) inspection and flaw evaluation in conformance with the guidelines of staff-approved boiling water reactor vessel and internals project BWRVIP-48 and (b) monitoring and control of reactor coolant water chemistry in accordance with the guidelines of BWRVIP-130.

A.1.5 BWR FEEDWATER NOZZLE

The BWR Feedwater Nozzle aging management program is an existing program that provides for monitoring of feedwater nozzles for cracking through station procedures based on the 1995 Edition through 1996 Addendum of ASME Section XI, Subsection IWB, Table IWB 2500-1. The program specifies periodic ultrasonic (UT) inspections of critical regions of the feedwater nozzle. The inspections are performed at intervals not exceeding ten years.

The Oyster Creek Feedwater Nozzle aging management program will be enhanced to implement the recommendations of the BWR Owners Group Licensing Topical Report General Electric (GE) NE-523-A71-0594. These enhancements will be implemented prior to entering the period of extended operation.

A.1.6 BWR CONTROL ROD DRIVE RETURN LINE NOZZLE

The BWR Control Rod Drive Return Line nozzle aging management program is an existing program that provides for monitoring of the control rod drive return line nozzle for cracking through station procedures based on ASME Section XI, Subsection IWB, Table IWB 2500-1, augmented by inspections performed in accordance with the inspection recommendations of NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking." Based on an NRC approved relief request the periodic dye penetrate tests required by NUREG-0619 have been replaced by ultrasonic measurements. The inspections will be performed at intervals not exceeding ten years. Modifications were made to the control rod drive return line nozzle thermal sleeve to mitigate or prevent thermally induced fatigue cracking.

A.1.7 BWR STRESS CORROSION CRACKING

The BWR Stress Corrosion Cracking aging management program is an existing program based on NUREG-0313, and Nuclear Regulatory Commission Generic Letter 88-01and its Supplement 1NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping," GL 88-01, "NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping," and its Supplement 1, BWRVIP-75, "Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules," and ASME Section XI. The scope of the BWR Stress Corrosion Cracking aging management program includes reactor coolant pressure boundary components and piping four inches and larger nominal pipe size made of stainless steel and exposed to reactor coolant above 200°F. The program includes (a) replacements and preventive measures to mitigate mitigates intergranular stress corrosion cracking (IGSCC) and (b) inspections to monitor IGSCC and its effects. Water chemistry is controlled through implementation of the recommendations of BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines”.

A.1.8 BWR PENETRATIONS

The BWR Penetrations aging management program is an existing program that includes (a) inspection and flaw evaluation in conformance with the guidelines of staff-approved Boiling Water Reactor Vessel and Internals Project (BWRVIP)-49-A, “Instrument Penetration Inspection and Flaw Evaluation Guidelines,” and BWRVIP-27-A, “BWR Standby Liquid Control System/Core Plate Delta-P Inspection and Flaw Evaluation Guidelines,” documents and (b) monitoring and control of reactor coolant water chemistry in accordance with industry-recognized guidelines of BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines,” to ensure the long-term integrity and safe operation of boiling water reactor vessel internal components. The requirements of ASME Section XI will be implemented in accordance with 10 CFR 50.55(a).

A.1.9 BWR VESSEL INTERNALS

The BWR Vessel Internals aging management program is an existing program that mitigates the effects of stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), and irradiation assisted stress corrosion cracking (IASCC) in reactor pressure vessel internals through water chemistry activities that are implemented through station procedures and are consistent with the guidelines of BWRVIP-130: " BWR Vessel and Internals Project BWR Water Chemistry Guidelines”. The program also manages the integrity of reactor pressure vessel internals through condition monitoring activities that consist of examinations implemented through station procedures consistent with the recommendations of the BWRVIP guidelines, as well as the requirements of ASME Section XI.

The BWR Vessel Internals program at Oyster Creek is consistent with the guidelines contained in BWRVIP-94, “BWR Vessel and Internals Project, Program Implementation Guideline.” Inspections and evaluations of reactor components are consistent with the guidelines provided in the following BWRVIP reports:

- BWRVIP-18-A, BWR Core Spray Inspection and Flaw Guidelines
- BWRVIP-25, BWR Core Plate Inspection and Flaw Evaluation Guidelines
- BWRVIP-26, BWR Top guide Inspection and Flaw Evaluation Guidelines
- BWRVIP-27-A, BWRVIP Standby Liquid Control System/Core Spray/ Core Plate ∆P Inspection and Flaw Evaluation Guidelines.
- BWRVIP-38, BWR Shroud Support Inspection and Flaw Evaluation guidelines
- BWRVIP-47, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines

- BWRVIP-48, Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines.
- BWRVIP-49-A, Instrument Penetration Inspection and Flaw Evaluation Guidelines.
- BWRVIP-74-A, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines.
- BWRVIP-76, BWR Core Shroud Inspection and Flaw Evaluation Guidelines
- BWRVIP-104,“ Evaluation and Recommendations to Address Shroud Support Cracking in BWRs”

The program will be enhanced to include inspection of the steam dryer in accordance with BWRVIP-139. The program will also be enhanced to inspect the top guide as recommended in NUREG-1801. In addition, the program will be revised to include rolling of the CRD stub tubes as a permanent repair, once the NRC approves the ASME code case. If the ASME code case is not approved, the program will be changed to use a permanent repair acceptable to the NRC. Enhancements to the program will be implemented prior to entering the period of extended operation.

A.1.10 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) aging management program is a new program that will provide for aging management of CASS reactor internal components within the scope of license renewal. The program will be implemented prior to the period of extended operation.

The program will include a component specific evaluation of the loss of fracture toughness in accordance with the criteria specified in NUREG 1801, XI.M13. For those components where loss of fracture toughness may affect function of the component, a supplemental inspection will be performed. This inspection will ensure the integrity of the CASS components exposed to the high temperature and neutron fluence present in the reactor environment.

A.1.11 FLOW-ACCELERATED CORROSION

The Flow-Accelerated Corrosion (FAC) aging management program is an existing program based on EPRI guidelines in NSAC-202L-R2, “Recommendations for an Effective Flow Accelerated Corrosion Program.” The program predicts, detects, and monitors wall thinning in piping, fittings, valve bodies, and Feedwater Heaters due to FAC. Analytical evaluations and periodic examinations of locations that are most susceptible to wall thinning due to FAC are used to predict the amount of wall thinning in pipes, fittings, and Feedwater Heater shells. Program activities include analyses to determine critical locations, baseline inspections to determine the extent of thinning at these critical locations, and follow-up inspections to confirm the predictions. Repairs and replacements are performed as necessary.

A.1.12 BOLTING INTEGRITY

The Bolting Integrity aging management program is an existing program that incorporates industry recommendations of EPRI NP-5769, "Degradation and Failure of Bolting in Nuclear Power Plants," and includes periodic visual inspections of closure bolting for loss of bolting function. Inspection of Class 1, 2, and 3 components is conducted in accordance with ASME Section XI. The requirements of ASME Section XI will be implemented in accordance with 10 CFR 50.55(a). Program activities address the guidance contained in EPRI TR-104213, "Bolted Joint Maintenance and Applications Guide". Non-ASME Class 1, 2 and 3 bolted joint inspections rely on detection of visible leakage during maintenance or routine observation.

The Bolting Integrity program does not address Primary Containment pressure retaining, structural and component support bolting. Primary Containment pressure retaining bolting are addressed by ASME Section XI, Subsection IWE, B.1.27. The Structures Monitoring Program, B.1.31 addresses the aging management of structural bolting. The ASME Section XI, Subsection IWF program, B.1.28, addresses aging management of ASME Section XI Class 1, 2, and 3 and Class MC support members.

A.1.13 OPEN-CYCLE COOLING WATER SYSTEM

The Open-Cycle Cooling Water System (OCCWS) aging management program is an existing program that manages aging of piping, piping components, piping elements and heat exchangers that are included in the scope of license renewal for loss of material and reduction of heat transfer and are exposed to raw water - salt water at Oyster Creek. Program activities include (a) surveillance and control of biofouling (including biocide injection), (b) verification of heat transfer capabilities for components cooled by the Service Water and Emergency Service Water systems, (c) inspection and maintenance activities, (d) walkdown inspections, and (e) review of maintenance, operating and training practices and procedures. Inspections may include visual, UT, and Eddy Current Testing (ECT) methods. The program will be enhanced to include specificity on inspection of heat exchangers for loss of material due to general, pitting, crevice, galvanic and microbiologically influenced corrosion in the RBCCW, TBCCW and Containment Spray preventative maintenance tasks. Additionally, the program will be enhanced to include volumetric inspections, for piping that has been replaced, at a minimum of 4 aboveground locations every 4 years based on the observed and anticipated performance of the new pipe. Enhancements to the program will be implemented prior to entering the period of extended operation. The OCCWS aging management program is based on the recommendations of NRC Generic Letter 89-13.

A.1.14 CLOSED-CYCLE COOLING WATER SYSTEM

The Closed-Cycle Cooling Water System aging management program is an existing program that manages aging of piping, piping components, piping elements and heat exchangers that are included in the scope of license renewal for loss of material and reduction of heat transfer and are exposed to a closed cooling water environment at Oyster Creek. The Closed-Cycle Cooling Water System aging management program relies on preventive measures to minimize corrosion by maintaining inhibitors and by performing non-chemistry monitoring consisting of inspection and nondestructive examinations (NDEs) based on industry-recognized guidelines of EPRI 1007820, "Closed Cooling Water Chemistry Guidelines," for closed-cycle cooling water systems. Station maintenance inspections and NDE provide condition monitoring of heat exchangers exposed to closed-cycle cooling water environments.

A.1.15 BORAFLEX RACK MANAGEMENT PROGRAM

The Boraflex Rack Management Program is an existing program that provides for aging management of the Boraflex neutron poison material. The program consists of monitoring the condition of Boraflex by routinely sampling fuel pool silica levels, periodically trending the condition of Boraflex using RACKLIFE, and periodically performing in-situ measurement of boron-10 areal density using the BADGER device. The BADGER device test is conducted every 3 years.

A.1.16 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD (RELATED TO REFUELING) HANDLING SYSTEMS

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems aging management program is an existing program that confirms the effectiveness of the maintenance monitoring program and the effects of past and future usage on the structural reliability of cranes and hoists. Administrative controls ensure that only allowable loads are handled. As discussed in Crane Load Cycle Limit time-limited aging analysis (TLAA), the projected number of load cycles for 60 years is significantly lower than the design value and thus fatigue is not a concern for cranes during the period of extended operation. Cranes and hoists structural components, including the bridge, the trolley, bolting, lifting devices, and the rail system are visually inspected periodically for loss of material. Bolting is also monitored for loss of preload by inspecting for missing, detached, or loosened bolts. The program relies on procurement controls and installation practices, defined in plant procedures, to ensure that only approved lubricants and proper torque are applied to bolting.

Prior to the period of extended operation, the scope of the program will be enhanced to include additional hoists that have been identified as being in scope for license renewal per 10CFR54.4(a)(2). The program will also be enhanced to include inspections for rail wear, and loss of material, due to corrosion, of crane and hoist structural components.

A.1.17 COMPRESSED AIR MONITORING

The Compressed Air Monitoring aging management program is an existing program that consists of inspection, monitoring, and testing; including (1) pressure decay testing and visual inspections of system components; and (2) preventive monitoring that checks air quality at various locations in the system to ensure that dewpoint, particulates, and suspended hydrocarbons are kept within the specified limits. This program is consistent with responses to NRC Generic Letter 88-14 and incorporates ISA-S7.0.01-1996, "Quality Standard for Instrument Air."

A.1.18 BWR REACTOR WATER CLEANUP SYSTEM

The BWR Reactor Water Cleanup System aging management program is an existing program that describes the requirements for augmented inservice inspection (ISI) for stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC) on stainless steel Reactor Water Cleanup System piping welds outboard of the second containment isolation valves. The program includes inspection guidelines delineated in NUREG-0313, Rev. 2 and NRC Generic Letter (GL) 88-01. The program also provides for water chemistry control in accordance with BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines” to minimize the potential of crack initiation and growth due to SCC or IGSCC.

In accordance with Generic Letter (GL) 88-01, Supplement 1, upgrades and enhancements have been implemented to the RWCU isolation valves in accordance with Generic Letter 89-10 to ensure that the valves will produce sufficient thrust to perform their design basis function, which is the isolation of containment in the event of a pipe break downstream of the valves. Based on these upgrades/enhancements, an effective Hydrogen Water Chemistry program, and the complete lack of cracking found during any of the RWCU piping weld inspections under Generic Letter 88-01, all inspection requirements for the portion of the RWCU System outboard of the second containment isolation valves have been eliminated.

Reactor coolant system (RCS) chemistry activities that support the aging management program for the RWCU System consist of preventive measures that are used to manage cracking in license renewal components exposed to reactor water and steam. RCS chemistry activities provide for monitoring and controlling RCS water chemistry using Oyster Creek procedures and processes based on BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines.” The BWR Water Chemistry Guidelines include information to develop proactive plant-specific water chemistry programs to minimize IGSCC.

A.1.19 FIRE PROTECTION

The Fire Protection aging management program is an existing program that includes a fire barrier inspection program and a diesel-driven fire pump inspection program. The fire barrier inspection program requires periodic visual inspection of fire barrier penetration seals, fire wraps, fire barrier walls, ceilings, and floors, and periodic visual inspection and functional tests of fire rated doors to ensure that their operability is maintained. The program includes surveillance tests of fuel oil systems for the diesel-driven fire pumps to ensure that the fuel supply lines can perform intended functions. The program also includes visual inspections and periodic operability tests of halon and carbon dioxide fire suppression systems based on NFPA codes.

The Fire Protection aging management program will be enhanced to include:

- Specific fuel supply inspection criteria for fire pumps during tests
- Inspection of external surfaces of the halon and carbon dioxide fire suppression systems
- Additional inspection criteria for degradation of fire barrier walls, ceilings, and floors

Enhancements will be implemented prior to the period of extended operation.

A.1.20 FIRE WATER SYSTEM

The Fire Water System aging management program is an existing program that provides for system pressure monitoring, fire system header flow testing, pump performance testing, hydrant flushing, water sampling and visual inspections activities. System flow tests measure hydraulic resistance and compare results with previous testing, as a means of evaluating the internal piping conditions. Monitoring system piping flow characteristics ensures that signs of internal piping degradation from significant corrosion or fouling would be detected in a timely manner. Pump performance tests, hydrant flushing and system inspections are performed in accordance with applicable NFPA standards. A motor driven pump normally maintains fire water system pressure. Significant leakage (exceeding the capacity of this pump) would be identified by automatic start of the diesel driven fire pumps, which would initiate immediate investigation and corrective action.

The program will be enhanced to include sprinkler head testing in accordance with NFPA 25, “Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.” Samples will be submitted to a testing laboratory prior to being in service 50 years. This testing will be repeated at intervals not exceeding 10 years.

Prior to the period of extended operation, the program will be enhanced to include water sampling for the presence of MIC at an interval not to exceed 5 years, periodic non-intrusive wall thickness measurements of selected portions of the fire water system at an interval not to exceed every 10 years, and visual inspection of the redundant fire water storage tank heater during tank internal inspections.

A.1.21 ABOVEGROUND OUTDOOR TANKS

The Aboveground Outdoor Tanks aging management program is a new program that will manage corrosion of outdoor carbon steel and aluminum tanks. Paint is a corrosion preventive measure, and periodic visual inspections will monitor degradation of the paint and any resulting metal degradation of carbon steel tanks or the unpainted aluminum tank. In scope carbon steel tanks are both supported by structural steel and by earthen or concrete foundations. The aluminum tank is supported by an earthen foundation. Therefore, inspection of the sealant or caulking at the tank-foundation interface, and inspection of inaccessible tank locations and on-grade tank bottoms apply only to those tanks on earthen and concrete pads. Removal of insulation will permit visual inspection of insulated tank surfaces and caulking. This new inspection program will be implemented prior to the period of extended operation.

A.1.22 FUEL OIL CHEMISTRY

The Fuel Oil Chemistry aging management program is an existing program that includes preventive activities to provide assurance that contaminants are maintained at acceptable levels in fuel oil for systems and components within the scope of Licensing Renewal. The fuel oil tanks within the scope of license renewal are maintained by monitoring and controlling fuel oil contaminants in accordance with the guidelines of the American Society for Testing and Materials (ASTM). Fuel oil sampling and analysis is performed in accordance with approved procedures for new fuel and stored fuel. Fuel oil tanks are periodically drained of accumulated water and sediment. These activities effectively manage the effects of aging by providing reasonable assurance that potentially harmful contaminants are maintained at low concentrations. The Fuel Oil Chemistry aging management program will be enhanced to include:

- Routine analysis for particulate contamination using modified ASTM D 2276-00 Method A on fuel oil samples from the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank.
- Analysis for particulate contamination using modified ASTM D 2276-00 Method A on new fuel oil.
- Analysis for water and sediment using ASTM D 2709-96 for Fire Pond Diesel Fuel Tank bottom samples.
- Analysis for bacteria to verify the effectiveness of biocide addition in the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank.
- Periodic draining, cleaning, and inspection of the Fire Pond Diesel Fuel Tanks and the Main Fuel Oil Tank. Inspection activities will include the use of ultrasonic techniques for determining tank bottom thicknesses should there be any evidence of corrosion or pitting.

Enhancements will be implemented prior to the period of extended operation.

A.1.23 REACTOR VESSEL SURVEILLANCE

The Oyster Creek Reactor Vessel Surveillance aging management program is an existing program that monitors the effects of neutron embrittlement on the reactor vessel beltline materials. The program is based on the BWR Integrated Surveillance Program (ISP) and satisfies the requirements of 10 CFR 50, Appendix H. The Reactor Vessel Surveillance program is based upon BWRVIP-78, “BWR Vessel and Internals Project: BWR Integrated Surveillance Program Plan”, and BWRVIP-86-A, “BWR Vessel and Internals Project Updated BWR Integrated Surveillance Program (ISP) Implementation Plan”. The program will ensure coupon availability during the period of extended operation by saving withdrawn coupons for future reconstitution.

Oyster Creek will enhance the program to implement BWRVIP-116 “Integrated Surveillance Program (ISP) Implementation for License Renewal,” if approved by the NRC. If BWRVIP-116 is not approved, Exelon will provide a plant-specific surveillance plan for the license renewal period in accordance with 10 CFR 50, Appendices G and H prior to entering the period of extended operation.

A.1.24 ONE-TIME INSPECTION

The Oyster Creek One-Time Inspection aging management program is a new program that will address potentially long incubation periods for certain aging effects and will provide a means of confirming that an aging effect is either not occurring or is progressing so slowly as to not have an effect on the intended function of a structure or component within the extended period of operation. The One-Time Inspection program will provide measures to verify that an aging management program is not needed, confirms the effectiveness of existing activities, or determines that degradation is occurring which will require evaluation and corrective action. The inspections will be implemented prior to the period of extended operation to manage the effects of aging for selected components within the scope of license renewal.

Inspection methods will include visual examination or volumetric examinations. Acceptance criteria are in accordance with industry guidelines, codes, and standards. The One-Time Inspection program provides for the evaluation of the need for follow-up examinations to monitor the progression of aging if age-related degradation is found that could jeopardize an intended function before the end of the period of extended operation. Should aging effects be detected, the program triggers actions to characterize the nature and extent of the aging effect and determines what subsequent monitoring is needed to ensure intended functions are maintained during the period of extended operation.

A.1.25 SELECTIVE LEACHING OF MATERIALS

The Selective Leaching of Materials aging management program is a new program that will consist of inspections of a representative selection of components of the different susceptible materials to determine if loss of material due to selective leaching is occurring. One-time inspections will be consistent with ASME Section XI VT-1 visual inspection requirements and supplemented by hardness tests and other examinations of the selected set of components. If selective leaching is found, the condition will be evaluated to determine the need to expand inspections. This new inspection program will be implemented prior to the period of extended operation.

A.1.26 BURIED PIPING INSPECTION

The Buried Piping Inspection aging management program is an existing program that manages the external surface aging effects of loss of material for piping and piping system components in a soil (external) environment. The Oyster Creek buried piping activities consist of preventive and condition-monitoring measures to manage the loss of material due to external corrosion for piping, piping system components in the scope of license renewal that are in a soil (external) environment. The program will be enhanced to include inspection of buried piping within ten years of entering the period of extended operation, unless an opportunistic inspection occurs within this ten-year period. The program will also be enhanced to include the buried portions of the fire protection system and the piping located inside the vault in the scope of the program.

External inspections of buried components will occur opportunistically when they are excavated during maintenance. Upon entering the period of extended operation, inspection of buried piping will be performed within ten years, unless an opportunistic inspection occurs within this ten-year period. Program enhancements will be implemented prior to entering the period of extended operation.

A.1.27 ASME SECTION XI, SUBSECTION IWE

The ASME Section XI, Subsection IWE aging management program is an existing program based on ASME Code and complies with the provisions of 10 CFR 50.55a. The program consists of periodic inspection of primary containment surfaces and components, including integral attachments, and containment vacuum breakers system piping and components for loss of material, loss of sealing, and loss of preload.

Examination methods include visual and volumetric testing as required by the Code. Observed conditions that have the potential for impacting an intended function are evaluated for acceptability in accordance with ASME requirements or corrected in accordance with corrective action process. Procurement controls and installation practices, defined in plant procedures, ensure that only approved lubricants and tension or torque are applied to bolting.

A.1.28 ASME SECTION XI, SUBSECTION IWF

The ASME Section XI, Subsection IWF aging management program is an existing program that consists of periodic visual examination of ASME Section XI Class 1, 2, 3 and MC components and piping support members for loss of mechanical function and loss of material. Bolting which is included with these components is monitored for loss of material and loss of preload by inspecting for missing, detached, or loosened bolts. Identification of any aging effects would initiate evaluation and establishment of corrective actions. The requirements of ASME Section XI, Subsection IWF are implemented in accordance with 10 CFR 50.55(a). The scope of the program will be enhanced to include additional MC supports, and require inspection of underwater supports for loss of material due to corrosion and loss of mechanical function and loss of preload on bolting by inspecting for missing, detached, or loosened bolts. Procurement controls and installation practices, defined in plant procedures, ensure that only approved lubricants and torque are applied. Enhancements to the program will be implemented prior to entering the period of extended operation.

A.1.29 10 CFR PART 50, APPENDIX J

The 10 CFR Part 50, Appendix J aging management program is an existing program that monitors leakage rates through the containment pressure boundary, including the drywell and torus, penetrations, fittings, and other access openings, in order to detect age related degradation of the containment pressure boundary. Corrective actions are taken if leakage rates exceed acceptance criteria. The Appendix J program also detects age related degradation in material properties of gaskets, o-rings, and packing materials for the containment pressure boundary access points. Consistent with the current licensing basis, the containment leak rate tests are performed in accordance with the regulations and guidance provided in 10 CFR 50 Appendix J Option B, Regulatory Guide 1.163, “Performance-Based Containment Leak-Testing Program," NEI 94-01, “Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J,” and ANSI/ANS 56.8, “Containment System Leakage Testing Requirements.”

A.1.30 MASONRY WALL PROGRAM

The Masonry Wall Program is an existing program that is based on guidance provided in IE Bulletin 80-11, "Masonry Wall Design," and plant-specific monitoring proposed by IN 87-67, "Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11," for managing cracking of masonry walls. The program requires inspection of masonry walls for cracking on a frequency of 4 years. The Masonry Wall Program is part of the Structures Monitoring Program.

A.1.31 STRUCTURES MONITORING PROGRAM

The Structures Monitoring Program is an existing program that was developed to implement the requirements of 10 CFR 50.65 and is based on NUMARC 93-01, “Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Revision 2 and Regulatory Guide 1.160, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Revision 2. The program includes elements of the Masonry Wall Program and the RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants aging management program.

The program relies on periodic visual inspections to monitor the condition of structures and structural components, structural bolting, component supports, masonry block walls, water-control structures, the Fire Pond Dam, exterior surfaces of mechanical components that are not covered by other programs, and HVAC ducts, damper housings, and HVAC closure bolting. The program relies on procurement controls and installation practices, defined in plant procedures, to ensure that only approved lubricants and proper torque are applied to bolting in scope of the program.

The scope of the program will be enhanced to include structures and structural components that are not currently monitored; but determined to be in the scope of license renewal, submerged structures, component supports not covered by other programs, the Fire Pond Dam, exterior surfaces of mechanical components that are not covered by other programs, and exterior surfaces of HVAC ducts, damper housings, and closure bolting. The program will also be enhanced to require removal of piping and component insulation on a sampling basis to allow visual inspection of insulated surfaces. The program will also be enhanced to require sampling and testing of groundwater every 4 years to confirm that the soil environment is non-aggressive to below-grade concrete structures. The enhancements will be made prior to entering the period of extended operation.

Inspection criteria will be enhanced to provide reasonable assurance that change in material properties, cracking, loss of material, loss of form, reduction or loss of isolation function, reduction in anchor capacity due local degradation, and loss of preload are adequately managed so that the intended functions of structures and components within the scope of the program are maintained consistent with the current licensing basis during the period of extended operation.

Inspection frequency is every four (4) years; except for submerged portions of the water- control structures, which will be inspected when dewatered or on a frequency not to exceed ten (10) years. The program contains provisions for more frequent inspections to ensure that observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process.

A.1.32 RG 1.127, INSPECTION OF WATER-CONTROL STRUCTURES ASSOCIATED WITH NUCLEAR POWER PLANTS

The Oyster Creek RG 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," aging management program is an existing condition monitoring program that is a part of the Structures Monitoring Program. The program requires periodic inspection of the Intake Structure and Canal (UHS), and the Dilution structure concrete for loss of material, cracking, and changes in material properties. Steel components are inspected for loss of material due to corrosion, and the earthen dike and canal slopes are monitored for loss of material and loss of form. The program will be enhanced to include periodic inspection of the Fire Pond Dam for loss of material and loss of form. Other enhancements include periodic inspection of submerged concrete, wood, and steel components for age related degradations. Inspection frequency is every four (4) years; except for submerged portions of the structures, which will be inspected when the structures are dewatered, or on a frequency not to exceed 10 years. Enhancements to the program will be implemented prior to entering the period of extended operation.

A.1.33 PROTECTIVE COATING MONITORING AND MAINTENANCE PROGRAM

The Protective Coating Monitoring and Maintenance Program is an existing program that provides for aging management of Service Level I coatings inside the primary containment and Service Level II coatings for the external drywell shell in the area of the sandbed region. Service Level I coatings are used in areas where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair safe shutdown. Oyster Creek was not originally committed to Regulatory Guide 1.54 for Service Level I coatings because the plant was licensed prior to the issuance of this Regulatory Guide in 1974. Currently, Oyster Creek is committed to a modified version of this Regulatory Guide, as described in the response to GL 98-04, and, as detailed in the Exelon Quality Assurance Topical Report (QATR) NO-AA-10. Service Level II coatings provide corrosion protection and decontaminability in those areas outside of the primary containment that are subject to radiation exposure and radionuclide contamination. The Protective Coating Monitoring and Maintenance Program provides for inspections, assessment, and repairs for any condition that adversely affects the ability of Service Level I coatings, or sandbed region Service Level II coatings, to function as intended.

A.1.34 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new program that will be used to manage aging of non-EQ cables and connections during the period of extended operation. A representative sample of accessible cables and connections located in adverse localized environments will be visually inspected at least once every 10 years for indications of accelerated insulation aging such as embrittlement, discoloration, cracking, or surface contamination. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for a subject electrical cable or connection. This new program will be implemented prior to the period of extended operation.

A.1.35 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENT CIRCUITS

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits aging management program is an existing program that manages aging of the cables of the Intermediate Range Monitoring (IRM), Local Power Range Monitoring/Average Power Range Monitoring (LPRM/APRM), Reactor Building High Radiation Monitoring, and Air Ejector Offgas Radiation Monitoring systems that are sensitive instrumentation circuits with low-level signals and are located in areas where the cables and connections could be exposed to adverse localized environments caused by heat, radiation, or moisture. These adverse localized environments can result in reduced insulation resistance causing increases in leakage currents. Calibration testing and Current/Voltage (I/V) and Time Domain Reflectometry (TDR) testing are currently performed to ensure that the cable insulation resistance is adequate for the instrumentation circuits to perform their intended functions. Based on acceptance criteria related to instrumentation loop performance and cable testing set forth in the calibration and testing procedures, evaluation of unacceptable results is initiated under the Corrective Action Process. The calibration testing and cable testing used for this program are performed currently, and have proven effective in identifying the existence of degradation in the performance of the tested systems. The program will be enhanced to include a review of the calibration and cable testing results for cable aging degradation as recommended by NUREG 1801 Section XI.E2. The enhanced program will be implemented prior to the period of extended operation and will include a review of the calibration and cable testing results for cable aging degradation before the period of extended operation and every 10 years thereafter.

A.1.36 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new program that will be used to manage the aging of all 47 medium-voltage cable circuits at Oyster Creek. These cables may at times be exposed to moisture and may be subjected to system voltage for more than 25% of the time. Manholes, conduits and sumps associated with these cable circuits will be inspected for water collection at least once every 2 years and drained as required. The first inspections will be completed prior to the period of extended operation. In addition, the cable circuits will be tested using a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, or other testing that is state-of-the-art at the time the test is performed. The cable circuits will be tested at least once every 10 years. This new program will be implemented prior to the period of extended operation.

A.2 <u>PLANT SPECIFIC PROGRAMS</u>

This section provides summaries of the plant specific programs credited for managing the effects of aging.

A.2.1 PERIODIC TESTING OF CONTAINMENT SPRAY NOZZLES

The Periodic Testing of Containment Spray Nozzles aging management program is an existing program that provides for flow tests to demonstrate that the drywell and torus spray nozzles are not blocked by debris or corrosion products. Carbon steel piping upstream of the drywell and torus spray nozzles is subject to possible general corrosion. The periodic flow tests of drywell and torus spray nozzles address a concern that rust from the possible general corrosion may plug the spray nozzles. These periodic tests verify that the drywell and torus spray nozzles are free from plugging that could result from corrosion product buildup from upstream sources.

A.2.2 LUBRICATING OIL MONITORING ACTIVITIES

The Lubricating Oil Monitoring Activities aging management program is an existing program that manages loss of material, cracking, and fouling in lubricating oil heat exchangers, systems, and components in the scope of license renewal by monitoring physical and chemical properties in lubricating oil. Sampling, testing, and monitoring verify lubricating oil properties. Oil analysis permits identification of specific wear mechanisms, contamination, and oil degradation within operating machinery, and components of systems in scope for license renewal.

The Lubricating Oil Monitoring Activities program will be enhanced to add surveillance for verification of flow through the Fire Protection System diesel driven pump gearbox lubricating oil cooler. The enhancement will be implemented prior to the period of extended operation.

A.2.3 GENERATOR STATOR WATER CHEMISTRY ACTIVITIES

The Generator Stator Water Chemistry Activities aging management program is an existing program that manages loss of material aging effects by monitoring and controlling water chemistry. Generator stator water chemistry control maintains high purity water in accordance with General Electric and EPRI guidelines for stator cooling water systems. Generator stator water is continuously monitored for conductivity and periodically analyzed for impurities and dissolved oxygen, and an alarm annunciates if conductivity increases to a predetermined limit.

A.2.4 PERIODIC INSPECTION OF VENTILATION SYSTEMS

The Periodic Inspection of Ventilation Systems aging management program is an existing program that provides for periodic inspections of components in the ventilation systems in the scope of license renewal at Oyster Creek. The program includes inspections for penetrating corrosion on ventilation system components and evidence of aging and wear on elastomers for the portions of the systems that are within the scope of license renewal. Prior to the period of extended operation, the program will be enhanced to include duct exposed to soil, instrument piping and valves, restricting orifices and flow elements, and thermowells. The activities will also be enhanced to include inspection guidance for detection of the applicable aging effects.

A.2.5 PERIODIC INSPECTION PROGRAM

The Periodic Inspection Program is a new program that will consist of periodic inspections of selected systems to verify the integrity of the system and confirm the absence of identified aging effects. The initial inspections are scheduled for implementation prior to the period of extended operation. The purpose of the inspection is to determine if a specified aging effect is occurring. If the aging effect is occurring, an evaluation will be performed to determine the effect it will have on the ability of affected components to perform their intended functions for the period of extended operation, and appropriate corrective action is taken.

Inspection methods may include visual examination, surface or volumetric examinations. Acceptance criteria are in accordance with industry guidelines, codes, and standards. When inspection results fail to meet established acceptance criteria, an evaluation will be conducted, in accordance with the corrective action process, to establish additional actions or measures necessary to provide reasonable assurance that the component intended function is maintained during the period of extended operation. This new program will be implemented prior to the period of extended operation.

A.2.6 WOODEN UTILITY POLE PROGRAM

The Oyster Creek Wooden Utility Pole Program is a new program that will be used to manage loss of material and change of material properties for wooden utility poles in or near the Oyster Creek Substation that provide structural support for the conductors connecting the Offsite Power System and the 480/208/120V Utility (JCP&L) Non-Vital Power System to the Oyster Creek plant. The program consists of inspection on a 10-year interval by a qualified inspector. The wooden poles will be inspected for loss of material due to ant, insect, and moisture damage and for change in material properties due to moisture damage. This new program will be implemented prior to the period of extended operation.

A.2.7 PERIODIC MONITORING OF COMBUSTION TURBINE POWER PLANT

The Periodic Monitoring of Combustion Turbine Power Plant aging management program is an existing maintenance, inspection and testing program based on the Interconnection Agreement between AmerGen and FirstEnergy, the owner and operator of the Forked River Combustion Turbine power plant. The program includes maintenance and inspection activities performed by FirstEnergy, testing activities performed by FirstEnergy and AmerGen, and reliability monitoring activities performed by AmerGen engineering. The inspection, maintenance, and operational activities performed in accordance with the Interconnection Agreement provide assurance that the FRCTs will perform their intended function consistent with the current licensing basis throughout the period of extended operation.

A.3 <u>TLAA EVALUATION OF AGING MANAGEMENT PROGRAMS UNDER 10 CFR54.21(C)(1)(III)</u>

This section provides summaries of programs credited in the evaluation of Time-Limited Aging Analyses (TLAAs).

A.3.1 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

The Metal Fatigue of Reactor Coolant Pressure Boundary aging management program is an existing program that ensures that the design fatigue usage factor limit will not be exceeded during the period of extended operation. The program will be enhanced to calculate and track cumulative usage factors for bounding locations in the reactor coolant pressure boundary (reactor pressure vessel and Class I piping), containment torus, torus vents, and torus attached piping and penetrations. The program also tracks isolation condenser fatigue stress cycles. The program will be enhanced to use the EPRI-licensed FatiguePro® cycle counting and fatigue usage factor tracking computer program, which provides for calculation of stress cycles and fatigue usage factors from operating cycles, automated counting of fatigue stress cycles, and automated calculation and tracking of fatigue cumulative usage factors. FatiguePro calculates cumulative fatigue using both cycle-based and stress-based monitoring. The program will be enhanced prior to the period of extended operation.

A.3.2 ENVIRONMENTAL QUALIFICATION (EQ) PROGRAM

The Environmental Qualification (EQ) Program is an existing program that manages the aging of electrical equipment within the scope of 10 CFR 50.49, “Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants.” The program establishes, demonstrates, and documents the level of qualification, qualified configurations, maintenance, surveillance and replacements necessary to meet 10 CFR 50.49. A qualified life is determined for equipment within the scope of the program and appropriate actions such as replacement or refurbishment are taken prior to or at the end of the qualified life of the equipment so that the aging limit is not exceeded. The effects of aging on the intended functions will be adequately managed per the requirements of 10 CFR 54.21 (c)(1)(iii).

A.4 TIME-LIMITED AGING ANALYSIS SUMMARIES

As part of the application for a renewed license, 10 CFR 54.21(c) requires that an evaluation of Time-Limited Aging Analyses (TLAAs) for the period of extended operation be provided. The following TLAAs have been identified and evaluated to meet this requirement.

A.4.1 NEUTRON EMBRITTLEMENT OF THE REACTOR VESSEL AND INTERNALS

The ferritic materials of the reactor vessel are subject to embrittlement due to high energy neutron exposure. Reactor vessel neutron embrittlement is a TLAA.

A.4.1.1 Reactor Vessel Materials Upper-Shelf Energy Reduction Due to Neutron Embrittlement

The reactor vessel end-of-life neutron fluence has been recalculated for a 60-year (50 EFPY) extended licensed operating period using the RAMA methodology. The NRC has issued a SER for RAMA approving RAMA for reactor vessel fluence calculations. Oyster Creek will comply with the applicable requirements of the SER before the period of extended operation.

The 50 EFPY USE was evaluated by an equivalent margin analysis (EMA) using the 50 EFPY calculated fluence and the Oyster Creek surveillance capsule results, in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

A.4.1.2 Adjusted Reference Temperature for Reactor Vessel Materials Due to Neutron Embrittlement

The reactor vessel materials peak fluence, ΔRT_{NDT}, and ART values for the 60-year (50 EFPY) license operating period were calculated in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

A.4.1.3 Reactor Vessel Thermal Limit Analyses: Operating Pressure – Temperature Limits

Revised pressure-temperature (P-T) limits for a 60-year licensed operating life have been prepared and will be submitted to the NRC for approval prior to the start of the extended period of operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

A.4.1.4 Reactor Vessel Circumferential Weld Examination Relief

Relief has been granted from the requirements for inspection of RPV circumferential welds for the remainder of the current 40-year licensed operating period. The justification for relief is consistent with the guidelines of Boiling Water Reactor Vessel and Internals Program BWRVIP-05, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations." Application for an extension of this relief for the 60-year period of extended operation will be submitted prior to the end of the current operating license term.

The re-evaluation of the circumferential weld failure probability for 60 years depends on vessel ΔRT_{NDT} calculations. Although a conditional failure probability has not been calculated, the fact that the Oyster Creek 50 EFPY Mean RT_{NDT} value is less than the 64 EFPY value provided by the NRC leads to the conclusion that the Oyster Creek RPV conditional failure probability is bounded by the NRC analysis and is therefore acceptable. The procedures and training that will be used to limit the frequency of cold over-pressure events to the number specified in the SER for the RPV circumferential weld relief request extension, during the license renewal term, are the same as those approved for use in the current period end of the current operating license term.

The above analyses associated with reactor vessel circumferential weld examination relief has been projected to the end of the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

A.4.1.5 Reactor Vessel Axial Weld Examination Relief

BWRVIP-05, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations," estimated the 40-year end-of-life failure probability of a limiting reactor vessel axial weld, showed that it was orders of magnitude greater than the 40-year end-of-life circumferential weld failure probability, and used this analysis to justify relief form inspection of the circumferential welds, as described in Section a.4.1.4 above.

The re-evaluation of the axial weld failure probability for 60 years depends on vessel ΔRT_{NDT} calculations. The NRC staff review and BWRVIP calculations of the test-case failure probabilities assume that 90 percent of axial welds will be inspected. At Oyster Creek, less than 90 percent of axial welds can be inspected. As such, an analysis was performed for 50 EFPY to assess the effect on the probability of fracture due to the actual inspection performed on the vessel axial welds and to determine if the coverage was sufficient in the inspection of regions contributing to the majority of the risk.

The evaluation shows that the calculated unit-specific axial weld conditional failure probabilities at 60 years (50 EFPY) for Oyster Creek are less than the failure probabilities calculated by the NRC staff in the NRC BWRVIP-05 SER at 64 EFPY and the limiting CEOG values found in Table 3 of the SER supplement. The projected probability of failure of an axial weld at Oyster Creek will therefore provide adequate margin above the probability of failure of a circumferential weld, in support of relief from inspection of circumferential welds, for the extended licensed operating period, in accordance with the requirements of 10 CFR 54.21(c)(1)(ii).

A.4.1.6 Reactor Internals Components

The core plate, core shroud, incore instrumentation dry tubes, and top guide are exposed to high neutron fluence and are potentially susceptible to stress relaxation of bolting and irradiation assisted stress corrosion cracking (IASCC).

Because the core plate has wedges installed, relaxation of the hold bolts due to is not a concern. The top guide, core shroud, and incore dry tubes are considered susceptible to IASCC and require aging management. All three components (top guide, core shroud, and incore dry tubes) have been evaluated by the BWRVIP, as described in the Inspection and Evaluation Guidelines for each component. The Reactor Internals program described in Section A.3.1 will manage these aging effects.

This aging management program will ensure that aging effects in vessel internals exposed high fluence will be adequately managed for the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

A.4.2 METAL FATIGUE

The thermal and mechanical fatigue analyses of mechanical components have been identified as TLAAs for Oyster Creek. Specific components have been designed considering transient cycle assumptions, as listed in vendor specifications and the Oyster Creek UFSAR.

A.4.2.1 Reactor Vessel Fatigue Analyses

Reactor vessel fatigue analyses depend on cycle count assumptions that assume a 40-year operating period. The effects of fatigue in the reactor vessel will be managed for the period of extended operation by the Metal Fatigue of Reactor Coolant Pressure Boundary aging management program for cycle counting and fatigue usage factor tracking, as described in Section A.3.1.

This aging management program will ensure that fatigue effects in vessel pressure boundary components will be adequately managed and will be maintained within the design limits for the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

A.4.2.2 Fatigue Analysis of Reactor Vessel Internals

A.4.2.2.1 Low-cycle Thermal and Flow-Induced Vibration Fatigue Analysis of the Core Shroud and Repair Hardware

Low-cycle mechanical fatigue was evaluated only for the tie rod stabilizers in the core shroud repair evaluations. The maximum predicted CUF for the core shroud and core shroud repair hardware was found to be not significant. Therefore, the design of the core shroud repair hardware for fatigue effects is valid for the extended operating period in accordance with 10 CFR 54.21(c)(1)(i).

A.4.2.3 Reactor Coolant Pressure Boundary Piping and Component Fatigue Analysis

A.4.2.3.1 Reactor Coolant Pressure Boundary Piping and Components

Thermal cycle count is a consideration in all the codes associated with the design of reactor coolant pressure boundary and non-RCPB piping and components (e.g., USAS or ANSI B31.1).

The applicable piping codes require the use of a stress range reduction factor in the evaluation of calculated stresses due to thermal expansion. The reduction factor is based on the anticipated number of equivalent full temperature cycles over the total number of years the plant is expected to be in operation.

The number of thermal cycles assumed for design of RCPB and non-RCPB piping has been evaluated and the existing stress range reduction factor remains valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i).

A.4.2.3.3 Fatigue Analysis of the Isolation Condenser

The isolation condenser components were evaluated for 1500 heatup/pressurization cycles for 40 years. A review of isolation condenser operations since 1995 and a conservative estimate of earlier condenser operations based on number of unit scrams concluded that the projected total cycle count for 60 years is well below the number of design cycles.

The isolation condenser supporting system piping and components were evaluated for 400 heatup/pressurization cycles for 40 years. The “A” isolation condenser tubes bundles were replaced in 2000 and the “B” isolation condenser tube bundles were replaced in 1998. The isolation condenser piping was replaced in 1992. Conservatively using 1992 as the starting point for isolation condenser events for these components, a review of isolation condenser events since 1992 concluded that the projected total cycle count for 60 years is well below the number of design cycles.

The analyses of the effects of thermal cycle and thermal shock events on the Oyster Creek isolation condenser systems and components have been evaluated and remain valid for the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(i).

A.4.2.4 Effects of Reactor Coolant Environment on Fatigue Life of Components and Piping (Generic Safety Issue 190)

Generic Safety Issue (GSI) 190 was identified by the NRC because of concerns about potential effects of reactor water environments on component fatigue life during the period of extended operation.

Oyster Creek has performed plant-specific calculations for the applicable locations identified in NUREG/CR 6260, "Application of NUREG/CR-5999 Interim

Fatigue Curves to Selected Nuclear Power Plant Components," for older-vintage BWR plants. For each location, detailed environmental fatigue calculations were performed using the appropriate environmental fatigue (F_{en}) relationships from NUREG/CR 6583 for carbon and low-alloy steels and from NUREG/CR 5704 for stainless steels, as appropriate for the material at each of the locations. The results demonstrate that all CUF values, including appropriate environmental effects, are less than 1.0 for 60 years of plant operation and meet the requirements for the extended operating period in accordance with 10 CFR 54.21(c)(1)(ii).

Additionally, all of the above locations are included in the Metal Fatigue of Reactor Coolant Pressure Boundary (A.3.1) aging management program, and the CUF for these locations will continue to be tracked in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

A.4.3 ENVIRONMENTAL QUALIFICATION OF ELECTRICAL EQUIPMENT (EQ)

Electrical equipment included in the Oyster Creek Environmental Qualification Program, which has a specified qualified life of at least 40 years, involves time-limiting aging analyses for license renewal. The aging effects of this equipment will be managed in the Environmental Qualification Program discussed in Section A.3.2, “Environmental Qualification (EQ) of Electrical Components,” in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

A.4.4 FATIGUE OF PRIMARY CONTAINMENT, ATTACHED PIPING AND COMPONENTS

The Oyster Creek Mark I containment was originally designed to stress limit criteria without fatigue analyses. However, the discovery of significant hydrodynamic loads (“new loads”) caused by safety relief valve (SRV) and small, intermediate, and design basis pipe break discharges into the suppression pool required the reanalysis of the suppression chamber, vents, and attached piping and internal structures, including some fatigue analyses at limiting locations. These fatigue analyses of the suppression chamber, and its internals, and vents in each unit included assumed pressure and temperature cycles resulting from SRV discharge and design basis LOCA events. The scope of the analyses included pressure suppression chamber, the drywell-to-pressure suppression chamber vents, SRV discharge piping, other piping attached to the suppression chamber and its penetrations, and the drywell-to-suppression chamber vent bellows.

A.4.4.1 Fatigue Analysis of the Primary Containment System (Includes Suppression Chamber, Vents, Vent Headers, and Downcomers, SRV Discharge Piping Inside the Suppression Chamber, External Suppression Chamber Attached Piping, Associated Penetrations, Drywell-to-Suppression Chamber Vent Line Bellows, and Primary Containment Process Penetrations Bellows)

For low cumulative usage factor (CUF) locations (40-year CUF < 0.4) the Oyster Creek new loads analyses of each suppression chamber and its associated vents and downcomers, piping penetrations and vent bellows have been evaluated and remain valid for the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(i).

For higher cumulative usage factor locations in the analyses of the suppression chamber and its associated vents and downcomers, piping penetrations and vent bellows (40-year CUF ≥ 0.4) the effects of fatigue will be managed for the period of extended operation by the Metal Fatigue of Reactor Coolant Pressure Boundary aging management program, as described in Section A.3.1.

The fatigue management activities will ensure that fatigue effects in containment pressure boundary components are adequately managed and are maintained within code design limits for the period of extended operation, in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

A.4.4.2 Primary Containment Process Penetrations and Bellows Fatigue Analysis

The only containment process piping expansion joints subject to significant thermal expansion and contraction are those between the drywell shell penetrations and process piping. These are designed for a stated number of operating and thermal cycles.

The thermal cycle designs of Oyster Creek containment process penetration bellows have been evaluated and remain valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i).

A.4.5 OTHER PLANT-SPECIFIC TLAAS

A.4.5.1 Reactor Building, Turbine Building, and Heater Bay Crane Load Cycles

The reactor building, turbine building and heater bay cranes at Oyster Creek were designed to meet or exceed the design criteria of the Crane Manufacturers Association of America (CMAA) Specification 70, “Specifications for Electric Overhead Traveling Cranes,“ Class A1. These cranes are capable of a minimum of 20,000 cycles at rated capacity.

The load cycle design of these Oyster Creek cranes have been evaluated and remain valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i).

A.4.5.2 Drywell Corrosion

Analysis of the minimum wall thickness of the containment vessel is a TLAA. The aging effects will be managed by the ASME Section XI, Subsection IWE aging management program, in accordance with the requirements of 10 CFR 54.21(c)(1)(iii).

A.4.5.3 Equipment Pool and Reactor Cavity Walls Rebar Corrosion

Corrosion was found on a rebar in a localized area in the vicinity of the equipment pool and the analysis of the corrosion rate is a TLAA. The corrosion of the reinforcing bar has been projected to the end of the extended period in accordance with 10 CFR 54.21(c)(1)(ii), and determined that the integrity of the concrete will be maintained through the period of extended operation.

A.4.5.4 Reactor Vessel Weld Flaw Evaluations

Flaws evaluated in 2000 as part of the 2000 ISI inspections were based on conditions valid for the current life of the plant, including fluence at 32 EFPY, thermal transients, and existing P-T curves. These flaws were evaluated in accordance with ASME Section XI, IWB-3600 for the period of extended operation. These flaws have been reevaluated for 50 EFPY conditions in accordance with 10 CFR 54.21(c)(1)(ii) and found to be acceptable for the period of extended operation.

A.4.5.5 CRD Stub Flaw Evaluation

As part of the weld repair project for the CRD stubs during the construction phase of the plant, an evaluation of a postulated residual flaw was performed. The analysis of the postulated undetected flaw states that it would require more than 1000 startup and shutdown cycles to propagate the flaw to the surface, potentially leading to coolant leakage. The projected number of startup and shutdown cycles at the end of the period of extended operation is less than 275. Therefore the flaw evaluation is valid for the period of extended operation.

This flaw evaluation have been reevaluated for 60 years of operation in accordance with 10 CFR 54.21(c)(1)(ii) and found to be acceptable for the period of extended operation.

A.5 License Renewal Commitment List

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
1) ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	Existing program is credited. For the isolation condensers this program also includes enhancement activities identified in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," lines IV.C1-5 and IV.C1-6. These enhancement activities consist of: 1. Temperature and radioactivity monitoring of the shell-side (cooling) water, which will be implemented prior to the period of extended operation. 2. Eddy current testing of the tubes, with inspection (VT or UT) of the tubesheet and channel head, which will be performed during the first ten years of the extended period of operation.	A.1.1	Prior to the period of extended operation.	Section B.1.1
2) Water Chemistry	Existing program is credited.	A.1.2	Ongoing	Section B.1.2
3) Reactor Head Closure Studs	Existing program is credited.	A.1.3	Ongoing	Section B.1.3
4) BWR Vessel ID Attachment Welds	Existing program is credited.	A.1.4	Ongoing	Section B.1.4
5) BWR Feedwater Nozzle	Existing program is credited. The Oyster Creek Feedwater Nozzle aging management program will be enhanced to implement the recommendations of the BWR Owners Group Licensing Topical Report General Electric (GE) NE-523-A71-0594.	A.1.5	Prior to the period of extended operation.	Section B.1.5
6) BWR Control Rod Drive Return Line Nozzle	Existing program is credited.	A.1.6	Ongoing	Section B.1.6
7) BWR Stress Corrosion Cracking	Existing program is credited.	A.1.7	Ongoing	Section B.1.7
8) BWR Penetrations	Existing program is credited.	A.1.8	Ongoing	Section B.1.8

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
9) BWR Vessel Internals	Existing program is credited. The program will be enhanced to include: 1. Inspection of the steam dryer in accordance with BWRVIP-139. 2. Inspection of the top guide as recommended in NUREG-1801. 3. Rolling of the CRD stub tubes as a permanent repair, once the NRC approves the ASME code case. If the ASME code case is not approved, the program will be changed to use a permanent repair acceptable to the NRC.	A.1.9	Prior to the period of extended operation.	Section B.1.9
10) Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Program is new. The program will include a component specific evaluation of the loss of fracture toughness in accordance with the criteria specified in NUREG-1801, XI.M13. For those components where loss of fracture toughness may affect the intended function of the component, a supplemental inspection will be performed. This inspection will ensure the integrity of the CASS components exposed to the high temperature and neutron fluence present in the reactor environment.	A.1.10	Prior to the period of extended operation.	Section B.1.10
11) Flow-Accelerated Corrosion	Existing program is credited.	A.1.11	Ongoing	Section B.1.11
12) Bolting Integrity	Existing program is credited.	A.1.12	Ongoing	Section B.1.12
13) Open-Cycle Cooling Water System	Existing program is credited. The program will be enhanced as follows. Volumetric inspections, for piping that has been replaced, will be included at a minimum of 4 aboveground locations every 4 years. Inspection of heat exchangers will specify examination for loss of material due to general, pitting, crevice, galvanic and microbiologically influenced corrosion in the RBCCW, TBCCW and Containment Spray preventative maintenance tasks.	A.1.13	Prior to the period of extended operation.	Section B.1.13
14) Closed-Cycle Cooling Water System	Existing program is credited.	A.1.14	Ongoing	Section B.1.14
15) Boraflex Monitoring	Existing program is credited.	A.1.15	Ongoing	Section B.1.15
16) Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Existing program is credited. The scope of the program will be increased to include additional hoists that have been identified as a potential Seismic II/I concern and are in scope for 10CFR54.4(a)(2). The program will also be enhanced to include inspections for rail wear, and loss of material due to corrosion, of cranes and hoists	A.1.16	Prior to the period of extended operation.	Section B.1.16

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
	structural components, including the bridge, the trolley, bolting, lifting devices, and the rail system.			
17) Compressed Air Monitoring	Existing program is credited.	A.1.17	Ongoing	Section B.1.17
18) BWR Reactor Water Cleanup System	Existing program is credited. Based on Generic Letter 89-10 containment isolation valve upgrades/enhancements, an effective Hydrogen Water Chemistry program, and the complete lack of cracking found during any of the RWCU piping weld inspections performed under Generic Letter 88-01, all inspection requirements for the portion of the RWCU System outboard of the second containment isolation valves have been eliminated.	A.1.18	Ongoing	Section B.1.18
19) Fire Protection	Existing program is credited. The program will be enhanced to include: 1. Specific fuel supply inspection criteria for fire pumps during tests. 2. Inspection of external surfaces of the halon and carbon dioxide fire suppression systems. 3. Additional inspection criteria for degradation of fire barrier walls, ceilings, and floors.	A.1.19	Prior to the period of extended operation.	Section B.1.19
20) Fire Water System	Existing program is credited. The program will be enhanced to include: 1. Sprinkler head testing in accordance with NFPA 25, "Inspection, Testing and Maintenance of Water-Based Fire Protection Systems." Samples will be submitted to a testing laboratory prior to being in service 50 years. This testing will be repeated at intervals not exceeding 10 years. 2. Water sampling for the presence of MIC at an interval not to exceed 5 years. 3. Periodic non-intrusive wall thickness measurements of selected portions of the fire water system at an interval not to exceed every 10 years. 4. Visual inspection of the redundant fire water storage tank heater during tank internal inspections.	A.1.20	Prior to the period of extended operation.	Section B.1.20
21) Aboveground Outdoor Tanks	Program is new. The program will manage the corrosion of outdoor carbon steel and aluminum tanks. The program credits the	A.1.21	Prior to the period of extended operation.	Section B.1.21

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
	application of paint, sealant, and coatings as a corrosion preventive measure and performs periodic visual inspections to monitor degradation of the paint, sealant, and coatings and any resulting metal degradation.			
22) Fuel Oil Chemistry	Existing program is credited. The program will be enhanced to include: 1. Routine analysis for particulate contamination using modified ASTM D 2276-00 Method A on fuel oil samples from the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank. 2. Analysis for particulate contamination using modified ASTM D 2276-00 Method A on new fuel oil. 3. Analysis for water and sediment using ASTM D 2709-96 for Fire Pond Diesel Fuel Tank bottom samples. 4. Analysis for bacteria to verify the effectiveness of biocide addition in the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank. 5. Periodic draining, cleaning, and inspection of the Fire Pond Diesel Fuel Tanks and the Main Fuel Oil Tank. Inspection activities will include the use of ultrasonic techniques for determining tank bottom thicknesses should there be any evidence of corrosion or pitting.	A.1.22	Prior to the period of extended operation.	Section B.1.22
23) Reactor Vessel Surveillance	Existing program is credited. The program will be enhanced to implement BWRVIP-116 “Integrated Surveillance Program (ISP) Implementation for License Renewal,” if approved by the NRC. If BWRVIP-116 is not approved, Exelon will provide a plant-specific surveillance plan for the license renewal period in accordance with 10 CFR 50, Appendices G and H prior to entering the period of extended operation.	A.1.23	Prior to the period of extended operation.	Section B.1.23
24) One-Time Inspection	Program is new. The One-Time Inspection program will provide reasonable assurance that an aging effect is not occurring, or that the aging effect is occurring slowly enough to not affect the component or	A.1.24	Prior to the period of extended operation.	Section B.1.24

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
	structure intended function during the period of extended operation, and therefore will not require additional aging management. This program will be used for the following: 1. To confirm crack initiation and growth due to stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), or thermal and mechanical loading is not occurring in Class 1 piping less than four-inch nominal pipe size (NPS) exposed to reactor coolant. 2. To confirm the effectiveness of the Water Chemistry program to manage the loss of material and crack initiation and growth aging effects. 3. To confirm the effectiveness of the Closed Cycle Cooling Water System program to manage the loss of material aging effect. 4. To confirm the effectiveness of the Fuel Oil Chemistry program and Lubricating Oil Monitoring Activities program to manage the loss of material aging effect. 5. To confirm loss of material in stainless steel piping, piping components, and piping elements is insignificant in an intermittent condensation (internal) environment. 6. To confirm loss of material in steel piping, piping components, and piping elements is insignificant in an indoor air (internal) environment. 7. To confirm loss of material is insignificant for non-safety related (NSR) piping, piping components, and piping elements of vents and drains, floor and equipment drains, and other systems and components that could contain a fluid, and, are in scope for 10CFR54.4(a)(2) for spatial interaction. The scope of the program consists of only those systems not covered by other aging management activities.			
25) Selective Leaching of Materials	Program is new. The Selective Leaching of Materials program will consist of inspections of a representative selection of components of the different susceptible materials to determine if loss of material due to selective leaching is occurring. Visual inspections will be consistent with ASME Section XI VT-1 visual inspection requirements and supplemented by hardness tests and other examinations of the	A.1.25	Prior to the period of extended operation.	Section B.1.25

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
	selected set of components. If selective leaching is found, the condition will be evaluated to determine the need to expand inspections.			
26) Buried Piping Inspection	Existing program is credited. The program will be enhanced to include: 1. Inspection of buried piping within ten years of entering the period of extended operation, unless an opportunistic inspection occurs within this ten-year period. 2. The buried portions of the fire protection system and the piping located inside the vault.	A.1.26	Prior to the period of extended operation.	Section B.1.26
27) ASME Section XI, Subsection IWE	Existing program is credited.	A.1.27	Ongoing	Section B.1.27
28) ASME Section XI, Subsection IWF	Existing program is credited. The scope of the program will be enhanced to include additional MC supports, and require inspection of the underwater supports for loss of material due to corrosion and loss of mechanical function and loss of preload on bolting by inspecting for missing, detached, or loosened bolts.	A.1.28	Prior to the period of extended operation.	Section B.1.28
29) 10 CFR Part 50, Appendix J	Existing program is credited.	A.1.29	Ongoing	Section B.1.29
30) Masonry Wall Program	Existing program is credited. The Masonry Wall Program is part of the Structures Monitoring Program.	A.1.30	Ongoing	Section B.1.30
31) Structures Monitoring Program	Existing program is credited. The program includes elements of the Masonry Wall Program and the RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants aging management program. The Structures Monitoring Program will be enhanced to include: 1. Buildings, structural components and commodities that are not in scope of maintenance rule but have been determined to be in the scope of license renewal. These include miscellaneous platforms, flood and secondary containment doors, penetration seals, sump liners, structural seals, and anchors and embedment. 2. Component supports, other than those in scope of ASME XI, Subsection IWF.	A.1.31	Prior to the period of extended operation.	Section B.1.31

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
	3. Inspection of external surfaces of mechanical components that are not covered by other programs, HVAC duct, damper housings, and HVAC closure bolting. Inspection and acceptance criteria of the external surfaces will be the same as those specified for structural steel components and structural bolting. 4. The visual inspection of insulated surfaces will require the removal of insulation. Removal of insulation will be on a sampling basis that bounds insulation material type, susceptibility of insulated piping or component material to potential degradations that could result from being in contact with insulation, and system operating temperature. 5. Inspection of electrical panels and racks, junction boxes, instrument racks and panels, cable trays, offsite power structural components and their foundations, and anchorage. 6. Periodic sampling, testing, and analysis of ground water to confirm that the environment remains non-aggressive for buried reinforced concrete. 7. Periodic inspection of components submerged in salt water (Intake Structure and Canal, Dilution structure) and in the water of the fire pond dam, including trash racks at the Intake Structure and Canal. 8. Inspection of penetration seals, structural seals, and other elastomers for change in material properties. 9. Inspection of vibration isolators, associated with component supports other than those covered by ASME XI, Subsection IWF, for reduction or loss of isolation function. 10. The current inspection criteria will be revised to add loss of material, due to corrosion for steel components, and change in material properties, due to leaching of calcium hydroxide and aggressive chemical attack for reinforced concrete. Wooden piles and sheeting will be inspected for loss of material and change in material properties. 11. Periodic inspection of the Fire Pond Dam for loss of material and loss of form.			

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
32) RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Existing program is credited. The program is part of the Structures Monitoring Program. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants aging management program will be enhanced to include: 1. Monitoring of submerged structural components and trash racks. 2. Periodic inspection of components submerged in salt water (Intake Structure and Canal, Dilution structure) and in the water of the fire pond dam. 3. Periodic inspection of the Fire Pond Dam for loss of material and loss of form. 4. Inspection of steel components for loss of material, due to corrosion. 5. Inspection of wooden piles and sheeting for loss of material and change in material properties. 6. Parameters monitored will be enhanced to include change in material properties, due to leaching of calcium hydroxide, and aggressive chemical attack.	A.1.32	Prior to the period of extended operation.	Section B.1.32
33) Protective Coating Monitoring and Maintenance Program	Existing program is credited. The Oyster Creek Protective Coating Monitoring and Maintenance Program provides for aging management of Service Level I coatings inside the primary containment and Service Level II coatings for the external drywell shell in the area of the sand bed region.	A.1.33	Ongoing	Section B.1.33
34) Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Program is new. The program will be used to manage aging of non-EQ cables and connections during the period of extended operation. A representative sample of accessible cables and connections located in adverse localized environments will be visually inspected at least once every 10 years for indications of accelerated insulation aging.	A.1.34	Prior to the period of extended operation.	Section B.1.34

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
35) Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Existing program is credited. The program will be enhanced to include: 1. A review of the Reactor Building High Radiation Monitoring and Air Ejector Offgas Radiation Monitoring system calibration results for cable aging degradation before the period of extended operation and every 10 years thereafter. 2. A review of the LPRM/APRM and IRM system cable testing results for cable aging degradation before the period of extended operation and every 10 years thereafter.	A.1.35	Prior to the period of extended operation.	Section B.1.35
36) Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Program is new. The program manages the aging of inaccessible medium-voltage cables that feed equipment performing license renewal intended functions. These cables may at times be exposed to moisture and are subjected to system voltage for more than 25% of the time. Manholes, conduits and sumps associated with these cables will be inspected for water collection every 2 years and drained as required. In addition, the cable circuits will be tested using a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, or other testing that is state-of-the-art at the time the test is performed. The cables will be tested at least once every 10 years.	A.1.36	Prior to the period of extended operation.	Section B.1.36
37) Periodic Testing of Containment Spray Nozzles	Existing plant specific program is credited. Carbon steel piping upstream of the drywell and torus spray nozzles is subject to possible general corrosion. The periodic flow tests of drywell and torus spray nozzles address a concern that rust from the possible general corrosion may plug the spray nozzles. These periodic tests verify that the drywell and torus spray nozzles are free from plugging that could result from corrosion product buildup from upstream sources.	A.2.1	Ongoing	Section B.2.1

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
38) Lubricating Oil Monitoring Activities	Existing plant specific program is credited. The program manages loss of material, cracking, and fouling in lubricating oil heat exchangers, systems, and components in the scope of license renewal by monitoring physical and chemical properties in lubricating oil. Sampling, testing, and monitoring verify lubricating oil properties. Oil analysis permits identification of specific wear mechanisms, contamination, and oil degradation within operating machinery, and components of systems in scope for license renewal. The program will be enhanced to add surveillance for verification of flow through the Fire Protection System diesel driven pump gearbox lubricating oil cooler.	A.2.2	Prior to the period of extended operation.	Section B.2.2
39) Generator Stator Water Chemistry Activities	Existing plant specific program is credited. The program manages loss of material aging effects by monitoring and controlling water chemistry. Generator stator water chemistry control maintains high purity water in accordance with General Electric and EPRI guidelines for stator cooling water systems.	A.2.3	Ongoing	Section B.2.3
40) Periodic Inspection of Ventilation Systems	Existing plant specific program is credited. The program includes internal and external surface inspections of ventilation system components for indications of loss of material, such as rust, corrosion and pitting. Heat transfer surfaces are inspected for fouling. Flexible connection and door seal elastomer materials are inspected for detrimental changes in material properties, as evidenced by cracking, perforations in the material or leakage. The program will be enhanced to include duct exposed to soil, instrument piping and valves, restricting orifices and flow elements, and thermowells. The activities will also be enhanced to include inspection guidance for detection of the applicable aging effects.	A.2.4	Prior to the period of extended operation.	Section B.2.4
41) Periodic Inspection Program	Plant specific program is new. The program includes systems in the scope of license renewal that require periodic monitoring of aging effects, and are not covered by other existing periodic monitoring programs. Activities consist of a periodic inspection of selected systems and components to verify integrity and confirm the absence of identified aging effects. The inspections are condition monitoring examinations intended to assure that existing environmental	A.2.5	Prior to the period of extended operation.	Section B.2.5

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
	conditions are not causing material degradation that could result in a loss of system intended functions.			
42) Wooden Utility Pole Program	Plant specific program is new. The program is used to manage loss of material and change of material properties for wooden utility poles in or near the Oyster Creek Substation that provide structural support for the conductors connecting the Offsite Power System and the 480/208/120V Utility (JCP&L) Non-Vital Power System to the Oyster Creek plant. The program consists of inspection on a 10-year interval by a qualified inspector. The wooden poles are inspected for loss of material due to ant, insect, and moisture damage and for change in material properties due to moisture damage.	A.2.6	Prior to the period of extended operation.	Section B.2.6
43) Periodic Monitoring of Combustion Turbine Power Plant	Existing plant specific program is credited. The program assures the reliability of the Forked River Combustion Turbines power plant to provide an Alternate AC power source during a station blackout event. The program is based on the Interconnection Agreement between AmerGen and First Energy.	A.2.7	Ongoing	Section B.2.7
44) Metal Fatigue of Reactor Coolant Pressure Boundary	Existing program is credited. The program will be enhanced to use the EPRI-licensed FatiguePro cycle counting and fatigue usage factor tracking computer program. The computer program provides for calculation of stress cycles and fatigue usage factors from operating cycles, automated counting of fatigue stress cycles and automated calculation and tracking of fatigue cumulative usage factors. The program will also be enhanced to provide for calculating and tracking of the cumulative usage factors for bounding locations for the reactor pressure vessel, Class I piping, the torus, torus vents, torus attached piping and penetrations, and the isolation condenser.	A.3.1	Prior to the period of extended operation.	Section B.3.1
45) Environmental Qualification (EQ) Program	Existing program is credited. EQ components that cannot be qualified for 60-years will be replaced before the end of their qualified life.	A.3.2	Ongoing	Section B.3.2
46) New P-T curves	Revised pressure-temperature (P-T) limits for a 60-year licensed operating life have been prepared and will be submitted to the NRC for approval.	A.4.1.3	Prior to the period of extended operation.	Section 4.2.3
47) Circumferential Weld Exam Relief	Apply for extension Reactor Vessel Circumferential Weld Examination Relief for 60-year operation	A.4.1.4	Prior to the period of extended operation.	Section 4.2.4

ITEM NUMBER	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
48) Axial weld Exam Relief	Apply for extension Reactor Vessel Axial Weld Examination Relief for 60-year operation	A.4.1.5	Prior to the period of extended operation.	Section 4.2.5
49) Measure Drywell wall thickness	Drywell wall thickness will be monitored to ensure minimum wall thickness is maintained. The ASME Section XI, Subsection IWE aging management program, will manage the aging effects.	A.4.5.2	Ongoing	Section 4.7.2
50) Fluence Methodology	The NRC has issued a SER for RAMA approving RAMA for reactor vessel fluence calculations. Oyster Creek will comply with the applicable requirements of the SER.	A.4.1.1	Prior to the period of extended operation.	Section 4.2.1

APPENDIX B AGING MANAGEMENT PROGRAMS
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B.0 INTRODUCTION

B.0.1 OVERVIEW

License renewal Aging Management Program (AMP) descriptions are provided in this appendix for each program credited for managing aging effects based upon the Aging Management Review (AMR) results provided in Sections 3.1 through 3.6 of this application.

In general, there are four (4) types of AMPs:

- Prevention programs preclude aging effects from occurring.
- Mitigation programs slow the effects of aging.
- Condition monitoring programs inspect/examine for the presence and extent of aging.
- Performance monitoring programs test the ability of a structure or component to perform its intended function.

More than one type of AMP may be implemented for a component to ensure that aging effects are managed.

Part of the demonstration that the effects are adequately managed is to evaluate credited programs and activities against certain required attributes. Each of the AMPs described in this section has ten (10) elements which are consistent with the attributes described in Appendix A.1, “Aging Management Review – Generic (Branch Technical Position RLSB-1)” and in Table A.1-1 “Elements of an Aging Management Program for License Renewal” of NUREG-1800. The 10-element detail is not provided when the program is deemed to be consistent with the assumptions made in NUREG-1801. The 10-element detail is only provided when the program is plant specific.

Credit has been taken for existing plant programs whenever possible. As such, all programs and activities associated with a system, structure, component, or commodity grouping were considered. Existing programs and activities that apply to systems, structures, components, or commodity groupings were reviewed to determine whether they include the necessary actions to manage the effects of aging.

Existing plant programs were often based on a regulatory commitment or requirement, other than aging management. Many of these existing programs included the required license renewal 10-element attributes, and have been demonstrated to adequately manage the identified aging effects. If an existing program did not adequately manage an identified aging effect, the program was enhanced as necessary. Occasionally, the creation of a new program was necessary.

B.0.2 METHOD OF DISCUSSION

For those AMPs that are consistent with the assumptions made in Sections X and XI of NUREG-1801, or are consistent with exceptions, each program discussion is presented in the following format:

- A Program Description abstract of the overall program form and function is provided.
- A NUREG-1801 Consistency statement is made about the program.
- Exceptions to the NUREG-1801 program are outlined and a justification for the exceptions is provided.
- Enhancements or additions to the NUREG-1801 program are provided. A proposed schedule for completion is discussed.
- Operating Experience (OE) information specific to the program is provided.
- A Conclusion section provides a statement of reasonable assurance that the program is effective, or will be effective, once enhanced.

For those AMPs that are plant specific, the above form is followed with the additional discussion of each of the 10-elements.

B.0.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, and is consistent with the summary in Appendix A.2, "Quality Assurance For Aging Management Programs (Branch Technical Position IQMB-1)" of NUREG-1800. The Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls, and is applicable to the safety-related and non-safety related systems, structures, and components (SSCs) that are subject to AMR. In many cases, existing activities were found adequate for managing aging effects during the period of extended operation. Generically the three elements are applicable as follows:

Corrective Actions:

A single corrective actions process is applied regardless of the safety classification of the system, structure, or component. Corrective actions are implemented through the initiation of an Issue Report (IR) in accordance with the Corrective Action Program established in response to 10 CFR 50, Appendix B. The Corrective Action Program requires the initiation of an Issue Report for actual or potential problems, including unexpected plant equipment degradation, damage, failure, malfunction or loss. Site documents that implement aging management programs for license renewal will direct that an Issue Report be prepared in accordance with those procedures whenever non-conforming conditions are found (i.e., the acceptance criteria are not met). It is noted that previous Corrective Action Programs referred to Condition Reports (CRs) or CAPs for documenting actual or potential problems and non-conforming conditions. These terms are synonymous with the term Issue Report.

Equipment deficiencies are corrected through the Work Control Program in accordance with plant procedures. Although equipment deficiencies may initially be documented by the Work Control Program, the Corrective Action Program specifies that an Issue Report also be initiated, if required, for condition identification, assignment of significance level and investigation class, investigation, corrective action determination, investigation report review and approval, action tracking, and trend analysis.

The Corrective Action Program implements the requirements of the Exelon Quality Assurance Topical Report (QATR), Chapter 16, “Corrective Action.” Specifically, Conditions Adverse to Quality and Significant Conditions Adverse to Quality are resolved through direct action, the implementation of Corrective Actions, and where appropriate, the implementation of Corrective Actions to Prevent Recurrence.

Confirmation Process:

The focus of the confirmation process is on the follow-up actions that must be taken to verify effective implementation of corrective actions. The measure of effectiveness is in terms of correcting and precluding repetition of adverse conditions. The Corrective Action Program includes provisions for timely evaluation of adverse conditions and implementation of any corrective actions required, including root cause determinations and prevention of recurrence where appropriate (e.g., Significant Conditions Adverse to Quality). The Corrective Action Program provides for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, to ensure effective corrective actions are taken. The Corrective Action Program also monitors for potentially adverse trends. The existence of an adverse trend due to recurring or repetitive adverse conditions will result in the initiation of an Issue Report. The AMPs required for license renewal would also uncover any unsatisfactory condition due to ineffective corrective action.

Since the same 10 CFR 50, Appendix B corrective actions and confirmation process is applied for nonconforming safety related and non-safety related systems, structures, and components subject to Aging Management Review (AMR) for license renewal, the Corrective Action Program is consistent with the NUREG-1801 elements.

Administrative Controls:

The document control process applies to all generated documents, procedures, and instructions regardless of the safety classification of the associated system, structure, or component. Document control processes are implemented in accordance with the requirements of 10 CFR 50, Appendix B, “Quality Assurance Requirements for Nuclear Power Plants and Fuel Reprocessing Plants.” Implementation is further defined in the Exelon Quality Assurance Topical Report (QATR), Chapter 6, “Document Control.”

Administrative controls procedures provide information on procedures, instructions and other forms of administrative control documents, as well as guidance on classifying these documents into the proper document type and as-building frequency. Revisions will be made to procedures and instructions that implement or administer aging management program requirements for the purposes of managing the associated aging effects for the period of extended operation.

B.0.4 OPERATING EXPERIENCE

The Oyster Creek operating experience procedure provides for the screening and evaluation of current in-coming industry operating experience documents and information including NRC documents, INPO documents, General Electric Documents, Westinghouse documents, and other documents (e.g., Nuclear Event Reports, ANI/NEIL Bulletins, Vendor Technical Notifications, 10 CFR Part 21 Reports). The operating experience procedure also provides for the identification, screening, investigation, trending, and reporting/sharing of information and lessons learned from in-house events.

Each AMP summary in this appendix contains a discussion of operating experience relevant to the program. This information was obtained through the review of post-2001 industry operating experience, and, through the review of in-house operating experience captured by the Corrective Action Program, Program Self-Assessments, and Program Health Reports. Additionally, operating experience was obtained through interviews with system and program engineers. The operating experience in each AMP summary identifies past corrective actions that have resulted in program enhancements and provides objective evidence that the effects of aging have been, and will continue to be, adequately managed.

B.0.5 AGING MANAGEMENT PROGRAMS

The following AMPs are described in the sections listed in this appendix. The programs are either generic in nature as discussed in NUREG –1801, Section XI, or are plant-specific. NUREG-1801 programs are listed in Section B.1.0. Plant-specific programs are listed in Section B.2 All generic programs are fully consistent with or are, with some exceptions, consistent with programs discussed in NUREG-1801. Programs are identified as either existing or new.

1. 10 CFR Part 50, Appendix J (B.1.29) [Existing]
2. Aboveground Outdoor Tanks (B.1.21) [New]
3. ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1) [Existing]
4. ASME Section XI, Subsection IWE (B.1.27) [Existing]
5. ASME Section XI, Subsection IWF (B.1.28) [Existing]
6. Bolting Integrity (B.1.12) [Existing]
7. Boraflex Rack Management Program (B.1.15) [Existing]
8. Buried Piping Inspection (B.1.26) [Existing]
9. BWR Control Rod Drive Return Line Nozzle (B.1.6) [Existing]
10. BWR Feedwater Nozzle (B.1.5) [Existing]

11. BWR Penetrations (B.1.8) [Existing]
12. BWR Reactor Water Cleanup System (B.1.18) [Existing]
13. BWR Stress Corrosion Cracking (B.1.7) [Existing]
14. BWR Vessel ID Attachment Welds (B.1.4) [Existing]
15. BWR Vessel Internals (B.1.9) [Existing]
16. Closed-Cycle Cooling Water System (B.1.14) [Existing]
17. Compressed Air Monitoring (B.1.17) [Existing]
18. Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.1.34) [New]
19. Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits (B.1.35) [Existing]
20. Fire Protection (B.1.19) [Existing]
21. Fire Water System (B.1.20) [Existing]
22. Flow-Accelerated Corrosion (B.1.11) [Existing]
23. Fuel Oil Chemistry (B.1.22) [Existing]
24. Generator Stator Water Chemistry Activities (B.2.3) [Existing]
25. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B.1.36) [New]
26. Inspection of Overhead Heavy Load and Light Load Related to Refueling) Handling Systems (B.1.16) [Existing]
27. Lubricating Oil Monitoring Activities (B.2.2) [Existing]
28. Masonry Wall Program (B.1.30) [Existing]
29. One-Time Inspection (B.1.24) [New]
30. Open-Cycle Cooling Water System (B.1.13) [Existing]
31. Periodic Inspection of Ventilation Systems (B.2.4) [Existing]
32. Periodic Inspection Program (B.2.5) [New]
33. Periodic Monitoring of Combustion Turbine Power Plant (B.2.7) [Existing]
34. Periodic Testing of Containment Spray Nozzles (B.2.1) [Existing]
35. Protective Coating Monitoring and Maintenance Program (B.1.33) [Existing]

36. Reactor Head Closure Studs (B.1.3) [Existing]

37. Reactor Vessel Surveillance (B.1.23) [Existing]

38. RG 1.127, Inspection of Water-Control Structures associated With Nuclear Power Plants (B.1.32) [Existing]

39. Selective Leaching of Materials (B.1.25) [New]

40. Structures Monitoring Program (B.1.31) [Existing]

41. Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.1.10) [New]

42. Water Chemistry (B.1.2) [Existing]

43. Wooden Utility Poles Program (B.2.6) [New]

B.0.6 TIME-LIMITED AGING ANALYSES AGING MANAGEMENT PROGRAMS

The following Time Limited Aging Analyses AMPs are described in Section B.3 of this appendix as indicated. These programs are discussed in NUREG-1801, Section X. Programs are identified as either existing or new.

1. Environmental Qualification (EQ) Program (B.3.2) [Existing]

2. Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1) [Existing]

B.1 AGING MANAGEMENT PROGRAMS EVALUATED IN NUREG-1801

B.1.0 NUREG-1801 AGING MANAGEMENT PROGRAM CORRELATION

The correlation between the NUREG-1801 (Generic Aging Lessons Learned (GALL)) programs and the Oyster Creek Aging Management Programs (AMPs) is shown below. Links to the sections describing the Oyster Creek NUREG-1801 programs are provided.

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	OYSTER CREEK PROGRAM
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.1.1)
XI.M2	Water Chemistry	Water Chemistry (B.1.2)
XI.M3	Reactor Head Closure Studs	Reactor Head Closure Studs (B.1.3)
XI.M4	BWR Vessel ID Attachment Welds	BWR Vessel ID Attachment Welds (B.1.4)
XI.M5	BWR Feedwater Nozzle	BWR Feedwater Nozzle (B.1.5)
XI.M6	BWR Control Rod Drive Return Line Nozzle	BWR Control Rod Drive Return Line Nozzle (B.1.6)
XI.M7	BWR Stress Corrosion Cracking	BWR Stress Corrosion Cracking (B.1.7)
XI.M8	BWR Penetrations	BWR Penetrations (B.1.8)
XI.M9	BWR Vessel Internals	BWR Vessel Internals (B.1.9)
XI.M10	Boric Acid Corrosion	Not Applicable (PWR)
XI.M11	Nickel-Alloy Nozzles and Penetrations (Deleted)	Not Applicable (Deleted)
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Not Used – Aging effects managed by XI.M13

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	OYSTER CREEK PROGRAM
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) (B.1.10)
XI.M14	Loose Part Monitoring	Not Used
XI.M15	Neutron Noise Monitoring	Not Applicable (PWR)
XI.M16	PWR Vessel Internals (Deleted)	Not Applicable (Deleted)
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion (B.1.11)
XI.M18	Bolting Integrity	Bolting Integrity (B.1.12)
XI.M19	Steam Generator Tube Integrity	Not Applicable (PWR)
XI.M20	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System (B.1.13)
XI.M21	Closed-Cycle Cooling Water System	Closed-Cycle Cooling Water System (B.1.14)
XI.M22	Boraflex Monitoring	Boraflex Rack Management Program (B.1.15)
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B.1.16)
XI.M24	Compressed Air Monitoring	Compressed Air Monitoring (B.1.17)
XI.M25	BWR Reactor Water Cleanup System	BWR Reactor Water Cleanup System (B.1.18)
XI.M26	Fire Protection	Fire Protection (B.1.19)
XI.M27	Fire Water System	Fire Water System (B.1.20)
XI.M28	Buried Piping and Tanks Surveillance	Not Used – Aging effects managed by XI.M34
XI.M29	Aboveground Carbon Steel Tanks	Aboveground Outdoor Tanks (B.1.21)
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry (B.1.22)
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance (B.1.23)

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	OYSTER CREEK PROGRAM
XI.M32	One-Time Inspection	One-Time Inspection (B.1.24)
XI.M33	Selective Leaching of Materials	Selective Leaching of Materials (B.1.25)
XI.M34	Buried Piping and Tanks Inspection	Buried Piping Inspection (B.1.26)
XI.S1	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE (B.1.27)
XI.S2	ASME Section XI, Subsection IWL	Not Used – Oyster Creek does not have a concrete containment
XI.S3	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF (B.1.28)
XI.S4	10 CFR Part 50, Appendix J	10 CFR Part 50, Appendix J (B.1.29)
XI.S5	Masonry Wall Program	Masonry Wall Program (B.1.30)
XI.S6	Structures Monitoring Program	Structures Monitoring Program (B.1.31)
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants (B.1.32)
XI.S8	Protective Coating Monitoring and Maintenance Program	Protective Coating Monitoring and Maintenance Program (B.1.33)
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 (B.1.34)
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 (B.1.35)
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 (B.1.36)
XI.E4	Aging Management Program for Bus Ducts	Not Used – No bus or bus ducts in scope of license renewal

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	OYSTER CREEK PROGRAM
XI.E5	Aging Management Program for Fuse Holders	Not Used – No aging effects requiring management
XI.E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Not Used – No aging effects requiring management
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Metal Fatigue of Reactor Coolant Pressure Boundary (B.3.1)
X.S1	Concrete Containment Tendon Prestress	Not Used – Oyster Creek does not have a concrete containment
X.E1	Environmental Qualification (EQ) of Electrical Components	Environmental Qualification (EQ) Program (B.3.2)
N/A	Oyster Creek specific program	Periodic Testing of Containment Spray Nozzles (B.2.1)
N/A	Oyster Creek specific program	Lubricating Oil Monitoring Activities (B.2.2)
N/A	Oyster Creek specific program	Generator Stator Water Chemistry Activities (B.2.3)
N/A	Oyster Creek specific program	Periodic Inspection of Ventilation Systems (B.2.4)
N/A	Oyster Creek specific program	Periodic Inspection Program (B.2.5)
N/A	Oyster Creek specific program	Wooden Utility Poles Program (B.2.6)
N/A	Oyster Creek specific program	Periodic Monitoring of Combustion Turbine Power Plant (B.2.7)

B.1.1 ASME SECTION XI INSERVICE INSPECTION, SUBSECTIONS IWB, IWC, AND IWD

Program Description

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program is part of the Inservice Inspection (ISI) program and provides for condition monitoring of reactor coolant pressure retaining piping and components within the scope of license renewal. It also provides for condition monitoring of reactor internal components within the scope of license renewal, and the isolation condenser. The program is implemented through procedures that require examinations consistent with ASME Section XI, and through specific tasks that require the ASME Section XI augmentation activities identified in NUREG-1801.

The program includes:

- Cracking monitoring for susceptible inservice inspection components subject to a steam or treated water environment, through volumetric examinations of pressure retaining welds and their heat affected zones in piping components.
- Cracking monitoring of the reactor vessel flange leak detection line.
- Cracking monitoring of the isolation condensers through surface and volumetric examinations of pressure retaining nozzle welds and their heat affected zones that are subject to a steam or reactor water environment.
- Loss of material monitoring of portions of the isolation condensers subject to a steam or reactor water environment, through system pressure tests.
- Cracking detection of the isolation condenser tube side components due to stress corrosion cracking and intergranular stress corrosion cracking, or loss of material detection due to general, pitting and crevice corrosion through temperature and radioactivity monitoring of the shell-side (cooling) water, eddy current inspections of the tubes, and inspections (VT or UT) of the channel head and tube sheets.

NUREG-1801 Consistency

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program is consistent with the ten elements of aging management program XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 indicates that the aging of the isolation condenser is to be managed by ASME Section XI Inservice Inspection (ISI) Subsection IWB (for Class 1 components). However, the Oyster Creek isolation condensers are ISI

Class 2 on the tube side and ISI Class 3 on the shell side. Therefore, Subsections IWC and IWD are used, as Class 1 requirements do not apply.

NUREG-1801 specifies the 2001 ASME Section XI B&PV Code, 2002 and 2003 Addenda for Subsections IWB, IWC, and IWD. The current Oyster Creek ISI Program Plan for the fourth ten-year inspection interval effective from October 15, 2002 through October 14, 2012, approved per 10CFR50.55a, is based on the 1995 ASME Section XI B&PV Code, 1996 addenda. The next 120-month inspection interval for Oyster Creek will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a 12 months before the start of the inspection interval.

Enhancements

Enhancement activities, which are in addition to the requirements of ASME Section XI, Subsections IWB, IWC, and IWD, consist of temperature and radioactivity monitoring of the isolation condenser shell-side (cooling) water, eddy current testing of the tubes, and inspections (VT or UT) of the channel head and tube sheets, with verification of the effectiveness of the program through monitoring and trending of results. These enhanced inspection activities detect cracking due to stress corrosion cracking or intergranular stress corrosion cracking, and detect loss of material due to general, pitting and crevice corrosion, in order to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. Radioactivity and temperature monitoring of the shell side water will be implemented prior to the start of the period of extended operation. Due to the physical configuration of the isolation condensers and piping at Oyster Creek, eddy current inspection of the tubes, and access to the tubesheet and internal surfaces of the channel head, require cutting and re-welding of pressure boundary piping. Since the Oyster Creek isolation condenser tube bundles were replaced in the “A” isolation condenser in 2000 and in the “B” isolation condenser in 1998, utilizing upgraded materials that are more resistant to intergranular stress corrosion cracking, these inspections will be performed during the first ten years of the extended period of operation.

Operating Experience

Oyster Creek has successfully identified indications of age-related degradation prior to the loss of the intended functions of the components, and has taken appropriate corrective actions through evaluation, repair or replacement of the components in accordance with ASME Section XI and station implementing procedures. Some site-specific examples are provided below. Periodic self-assessments of the ISI programs have been performed to identify the areas that need improvement to maintain program quality.

An NDE examination of ESW piping for corrosion in 2002 identified an elbow with a measured wall thickness below the minimum pipe wall thickness. An evaluation was performed providing an operability justification until the following outage and the elbow was replaced during that outage.

During a Class 1 pressure test of Core Spray piping following a refueling outage, leakage was identified at a field weld. The indication was dispositioned for repair via the Corrective Action Program process. An expanded scope of examination of similar type welds was performed, with no additional indications found, supporting the conclusion that the observed defect was not a generic issue.

Conclusion

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program provides reasonable assurance that aging effects are adequately managed so that the intended functions of components within the scope of license renewal that are covered by this program are maintained consistent with the current licensing basis during the period of extended operation.

B.1.2 WATER CHEMISTRY

Program Description

The Water Chemistry aging management program is an existing program whose activities consist of measures that are used to manage aging of piping, piping components, piping elements and heat exchangers exposed to reactor water, condensate and feedwater, control rod drive water, demineralized water storage tank water (DWST), condensate storage tank water (CST), torus water, and spent fuel pool water. Reactor water, condensate, control rod drive, feedwater, demineralized water storage tank, condensate tank, torus and spent fuel pool water is classified as treated water for aging management. The program activities provide for monitoring and controlling of water chemistry using station procedures and processes based on BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines,” 2004 Revision for the prevention or mitigation of loss of material, reduction of heat transfer and cracking aging effects. The water chemistry program is also credited for mitigating loss of material and cracking for components exposed to sodium pentaborate and boiler treated water environments. The Standby Liquid Control system contains a treated water and sodium pentaborate solution controlled in accordance with plant procedures and Technical Specifications. The Heating and Process Steam system contains boiler treated water that is controlled in accordance with plant procedures.

As specified by NUREG-1801, the water chemistry program may not be effective in low flow or stagnant flow areas. The One-Time Inspection (B.1.24) aging management program includes provisions specified by NUREG-1801 for verification of chemistry control and confirmation of the absence of loss of material and cracking in stagnant flow areas in piping systems and components.

NUREG-1801 Consistency

The Water Chemistry aging management program is consistent with the ten elements of aging management program XI.M2, "Water Chemistry," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

- NUREG-1801 indicates that water chemistry control is in accordance with BWRVIP-29 for water chemistry in BWRs. BWRVIP-29 references the 1996 revision of EPRI TR-103515, "BWR Water Chemistry Guidelines." The Oyster Creek water chemistry program is based on BWRVIP-130, which is the 2004 Revision of "BWR Water Chemistry Guidelines." EPRI periodically updates the water chemistry guidelines, as new information becomes available. The NRC has acknowledged in the Dresden and Quad Cities SER on page 3-12 that the staff has previously reviewed implementation of Revision 2 of the EPRI BWR Water Chemistry Guidelines as documented in NUREG-1769, “Safety Evaluation Report Related to the License Renewal of Peach Bottom Atomic Power Station, Units 2 and 3". Therefore, the staff finds the use of revision 2 to be acceptable.

- In transitioning from TR-103515-R2 to BWRVIP-130, Oyster Creek's has reviewed BWRVIP-130 and has determined that the most significant difference from revision 2 is that a recent policy of the U.S. nuclear industry commits each nuclear utility to adopting the responsibilities and processes on the management of materials aging issues described in "*NEI 03-08: Guideline for the Management of Materials Issues.*" Section 1 of the BWR Water Chemistry Guidelines specifies which portions of the document are "*Mandatory," "Needed,"* or *"Good Practices,"* using the classification described in NEI 03-08. A new section (section 7) has been added and contains recommended goals for water chemistry optimization. These are "good practice" recommendations for targets that plants may use in optimizing water chemistry that balances the conflicting requirements of materials, fuel and radiation control. Significant time and expense may be required to meet these targets; thus efforts to achieve these goals should be considered in the context of the overall strategic plan for the plant. Therefore, Oyster Creek is not committing to obtaining these targets. All other changes do not change the original intent of revision 2 implementation.

- NUREG-1801 indicates that hydrogen peroxide is monitored to mitigate degradation of structural materials. The Oyster Creek program does not monitor for hydrogen peroxide because the rapid decomposition of hydrogen peroxide makes reliable data exceptionally difficult to obtain and BWRVIP-130 Section 6.3.3, "Water Chemistry Guidelines for Power Operation," does not address monitoring for hydrogen peroxide. Hydrogen addition to feedwater has been applied in order to mitigate occurrence of IGSCC of structural materials by suppressing the formation of hydrogen peroxide. The hydrogen addition has accomplished an Electrochemical Corrosion Potential (ECP) value less than -230mV, SHE (Standard Hydrogen Electrode). By maintaining a low ECP less than -230mV, SHE, the reactor water chemistry minimizes the effects from hydrogen peroxide below the threshold that prompted the issue raised in NUREG 1801. Oyster Creek uses the ISI program to investigate whether structural degradation in potentially affected locations is ongoing. Oyster Creek's ISI program provides for condition monitoring of the reactor vessel, reactor internal components and ASME Class 1 pressure retaining components in accordance with ASME Section XI, Subsection IWB. Indications and relevant conditions detected during examinations are evaluated in accordance with ASME Section XI Articles IWB-3000, for Class 1.

- NUREG-1801 indicates that dissolved oxygen is monitored. Consistent with the guidance provided in BWRVIP-130, condensate storage tank, demineralized water storage tank water, spent fuel pool water and torus water are not sampled for dissolved oxygen. The Oyster Creek chemistry procedures require monitoring of conductivity, chlorides, sulfates and total organic carbon (TOC) in accordance with limits set by BWRVIP-130 as an alternate method for ensuring component integrity.

- NUREG-1801 indicates that water quality (pH and conductivity) is maintained in accordance with established guidance. However, per BWRVIP-130, "BWR Water Chemistry Guidelines," Section 8.2.1.11, pH measurement accuracy in most BWR streams is generally suspect because of the dependence of the instrument reading on ionic strength of the sample solution. In addition, the monitoring of pH is not discussed in BWRVIP-130, Appendix B for condensate storage tank, demineralized water storage tank, or torus water. pH is not monitored for torus water, however pH is monitored in the CST & DWST. Alternate methods are applied to monitor the water chemistry of the torus in lieu of direct pH measurements. The Oyster Creek chemistry procedures require monitoring of conductivity, chlorides and sulfates in accordance with limits set by BWRVIP-130.

- Aging of Standby Liquid Control (SBLC) system components not in the reactor coolant pressure boundary section of SBLC system relies on monitoring and control of SBLC makeup water chemistry. The makeup water is monitored in lieu of the storage tank, because the sodium pentaborate that is maintained in the storage tank would mask most of the chemistry parameters monitored. The effectiveness of the water chemistry program will be verified by a one-time inspection of the SBLC system as discussed in the One-Time Inspection (B.1.24) aging management program.

Enhancements

None.

Operating Experience

Periodic self-assessments of the water chemistry activities have been and continue to be performed to identify areas that need improvement to maintain the quality performance of the activity.

The Water Chemistry program has identified instances where parameters were outside the established specifications. Increased sampling and actions to bring the parameters back into specification were initiated. The chemistry excursion is then documented in a condition report in accordance with plant administrative procedures. The corrective actions program ensures that the conditions adverse to quality are promptly corrected. If the deficiency is assessed to be significantly adverse to quality, the cause of the condition is determined and a corrective action plan is developed to preclude repetition. Some examples are as follows:

- The demineralized water system was contaminated due to a cross-connection with the fuel pool. The system was flushed and use of demineralized water required chemistry sampling to ensure that the water was ‘clean’. A plan was developed to sample the demineralized water system from many locations. The completion of this plan enabled the demineralized water system to be declared ‘clean’ again.

- There have been some instances of reactor water sulfate levels exceeding Action Level 1 limits of 5 ppb. When this occurred increased sampling was performed and corrective actions (such as placing 2 RWCU pump inservice) were implemented.

- A resin ingress caused by failure of the underdrain system occurred in one of the condensate demineralizers. This event was entered into the corrective action process and the apparent cause was determined to be due to incomplete work in the underdrain installation four years prior.

Conclusion

The Water Chemistry aging management program covers components within the scope of license renewal that are exposed to reactor water, condensate, feedwater, control rod drive water, condensate tank water, torus water, and spent fuel pool water.

The Program provides reasonable assurance that aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.3 REACTOR HEAD CLOSURE STUDS

Program Description

The Reactor Head Closure Studs aging management program provides for condition monitoring and preventive activities to manage stud cracking. The program is implemented through station procedures based on the examination and inspection requirements specified in ASME Section XI, Table IWB-2500-1 and preventive measures described in Regulatory Guide 1.65, “Materials and Inspection for Reactor Vessel Closure Studs.”

NUREG-1801 Consistency

The Reactor Head Closure Studs aging management program is consistent with exceptions with the ten elements of aging management program XI.M3, "Reactor Head Closure Studs," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG-1801 indicates this program is to perform ISI in conformance with ASME Section XI, Subsections IWB 2001 edition including the 2002 and 2003 Addenda, Table 2500-1. The current ASME code of record for ISI at Oyster Creek is the 1995 Edition through the 1996 Addenda. For justification of exceptions to the ISI program see the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program, B1.1.

Enhancements

None.

Operating Experience

Oyster Creek is currently in its fourth ISI inspection interval. In the history of the Oyster Creek ISI program no evidence of head stud cracking has been found. The reactor head closure studs, nuts, washers, and bushings have been coated with a manganese phosphate surface treatment. The operating experience for these components indicates that nicks, scratches, gouges, and thread damage have occurred due to maintenance activities during refueling outages. This normal wear type of damage was determined to be acceptable for continued service. There have been no deficiencies attributed to distortion/plastic deformation from stress relaxation or loss of material due to mechanical wear. This provides evidence that the aging management program is effective.

Conclusion

The Reactor Head Closure Studs aging management program provides reasonable assurance that the aging effects are adequately managed, so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.4 BWR VESSEL ID ATTACHMENT WELDS

Program Description

The BWR Vessel ID Attachment Welds aging management program activities incorporate the inspection and evaluation recommendations of BWRVIP-48, as well as the water chemistry recommendations of BWRVIP-130. The program is implemented through station procedures that provide for mitigation of cracking through water chemistry and monitoring for cracking through in-vessel examinations. Reactor vessel attachment weld inspections are implemented through station procedures that are part of in-service inspection and incorporate the requirements of ASME, Section XI. Inspections are performed in accordance with ASME requirements consistent with BWRVIP-48.

NUREG-1801 Consistency

The BWR Vessel ID Attachment Welds aging management program is consistent with the ten elements of aging management program XI.M4, "BWR Vessel ID Attachment Welds," specified in NUREG-1801 with the following exceptions.

Exceptions to NUREG-1801

NUREG-1801 indicates that water chemistry control is in accordance with BWRVIP-29 for water chemistry in BWRs. BWRVIP-29 references the 1993 revision of EPRI TR-103515, "BWR Water Chemistry Guidelines." The Oyster Creek water chemistry programs are based on BWRVIP-130: "BWR Vessel and Internals Project BWR Water Chemistry Guidelines", which is the 2004 revision of "BWR Water Chemistry Guidelines". For justification of exceptions to the water chemistry program see the Water Chemistry aging management program, B.1.2.

Additionally, NUREG-1801 program XI.M9 references ASME Section XI, Table IWB 2500-1 (2001 edition, including the 2002 and 2003 Addenda). Oyster Creek ISI program is based on the 1995 (including 1996 Addenda) version of ASME Section XI. For justification of exceptions to the ISI program see the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program, B1.1.

Enhancements

None.

Operating Experience

The Oyster Creek inspection and testing methodologies have not detected cracking in the attachment welds in history of the Oyster Creek plant. This provides evidence that the Water Chemistry program has been effective in minimizing the effects of stress corrosion cracking in the attachments welds.

The same inspection and testing methodologies are used for the attachments welds as are used for other reactor internals. These processes have detected cracking in other vessel internals components, as described in the operating experience of the BWR Vessel Internals program, B.1.9

Conclusion

The BWR Vessel ID Attachment Welds aging management program provides reasonable assurance that the intended functions of vessel ID attachment welds are maintained consistent with the current licensing basis during the period of extended operation.

B.1.5 BWR FEEDWATER NOZZLE

Program Description

The BWR Feedwater Nozzle aging management program is an existing program that provides for monitoring of feedwater nozzles for cracking through station procedures based on the 1995 Edition through 1996 Addendum of ASME Section XI, Subsection IWB, Table IWB 2500-1. The program specifies periodic ultrasonic (UT) inspections of critical regions of the feedwater nozzle. The inspections are performed at intervals not exceeding ten years.

NUREG-1801 Consistency

The BWR Feedwater Nozzle aging management program with the enhancements described below is consistent with the ten elements of aging management program XI.M5, "BWR Feedwater Nozzle," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG-1801 program XI.M5 references ASME Section XI, Table IWB 2500-1 (2001 edition, including the 2002 and 2003 Addenda). Oyster Creek ISI program is based the 1995 (including 1996 Addenda) version of ASME Section. For justification of exceptions to the ISI program see the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program, B1.1.

Enhancements

The Oyster Creek Feedwater Nozzle aging management program will be enhanced to implement the recommendations of the BWR Owners Group Licensing Topical Report General Electric (GE) NE-523-A71-0594. These enhancements will be implemented prior to entering the period of extended operation.

Operating Experience

Oyster Creek inspected the feedwater nozzles in 1977 in response to industry experience at that time. Cracks were found in the nozzles and repaired. To minimize thermal cycling and fatigue induced cracking the thermal sleeve was modified with a piston type design. Subsequent inspections, the most recent in 2000, have found no indication of cracking in the feedwater nozzle. This provides evidence that the thermal sleeve modification has been effective in mitigating the effects of thermal fatigue on the Feedwater nozzle.

Conclusion

The BWR Feedwater Nozzle aging management program provides reasonable assurance that the aging effects of cracking are adequately managed so that the intended functions of the feedwater nozzles are maintained consistent with the current licensing basis during the period of extended operation.

B.1.6 BWR CONTROL ROD DRIVE RETURN LINE NOZZLE

Program Description

The BWR Control Rod Drive Return Line Nozzle aging management program provides for monitoring of the control rod drive return line nozzle for cracking through station ISI procedures based on the ASME Section XI, augmented by inspections performed in accordance with the inspection recommendations of NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking." Oyster Creek requested and received relief from the NRC for the requirement of NUREG–0619 to perform ultrasonic examination (UT) testing in lieu of periodic dye penetrant testing (PT). The inspections will be performed at intervals not exceeding ten years.

NUREG-1801 Consistency

The BWR Control Rod Drive Return Line Nozzle aging management program is consistent with the ten elements of aging management program XI.M6, "BWR Control Rod Drive Return Line Nozzle," specified in NUREG-1801with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 program XI.M6 references ASME Section XI, Table IWB 2500-1 (2001 edition, including the 2002 and 2003 Addenda). Oyster Creek ISI program is based the 1995 (including 1996 Addenda) version of ASME Section XI. For justification of exceptions to the ISI program see the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program, B1.1.

The Oyster Creek augmented ISI program for the CRD return line nozzle performs ultrasonic examination (UT) testing in lieu of dye penetrant testing (PT). Oyster Creek requested and received relief from the NRC to perform ultrasonic examination (UT) testing in lieu of the periodic PT testing requirements specified in NUREG 0619.

NUREG-1801, XI.M6, specifies any detected crack be ground out. Oyster Creek procedures allow a crack that is found unacceptable under IWB-3400 and IWB-3500 to be evaluated under ASME XI, IWB-3600 or repaired by an NRC approved procedure.

Enhancements

None.

Operating Experience

Oyster Creek inspected the CRD nozzle in 1977 in response to industry experience at that time. No cracks were found in the nozzle. To minimize thermal cycling and fatigue induced cracking the thermal sleeve was modified to divert the relatively cold CRD flow away from the nozzle. The most recent inspection of the nozzle in 2002 confirms the lack of cracking in the nozzle area. This provides good evidence that the thermal sleeve modification has been effective in mitigating the effects of thermal fatigue on the CRD nozzle.

Conclusion

The BWR Control Rod Drive Return Line Nozzle aging management program provides reasonable assurance that the aging effects of cracking are adequately managed so that the intended functions of the control rod drive return line nozzles are maintained consistent with the current licensing basis during the period of extended operation.

B.1.7 BWR STRESS CORROSION CRACKING

Program Description

BWR Stress Corrosion Cracking aging management program is an existing program that mitigates intergranular stress corrosion cracking (IGSCC) in stainless steel reactor coolant pressure boundary piping components and piping four inches and greater nominal pipe size exposed to reactor coolant above 200°F. Preventive measures include monitoring and controlling of water impurities by water chemistry activities and providing replacement stainless steel components in the solution annealed condition with a maximum carbon content of 0.035 wt. % and a minimum ferrite level of 7.5 wt. %. Inspection and flaw evaluation are conducted in accordance with the inservice inspection program plan for the station.

The program is implemented through station procedures based on NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping Rev. 2," GL 88-01, "NRC Position on Intergranular Stress Corrosion Cracking (IGSCC) in BWR Austenitic Stainless Steel Piping," and its Supplement 1, BWRVIP-75, "Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules," BWRVIP-130, “BWR Vessel and Internals Project BWR Water Chemistry Guidelines," and ASME Section XI.

NUREG-1801 Consistency

The BWR Stress Corrosion Cracking aging management program is consistent with the ten elements of aging management program XI.M7, "BWR Stress Corrosion Cracking," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 indicates that water chemistry control is in accordance with BWRVIP-29 for water chemistry in BWRs. BWRVIP-29 references the 1996 revision of EPRI TR- 103515, "BWR Water Chemistry Guidelines." The Oyster Creek water chemistry program is based on BWRVIP-130, “BWR Vessel and Internals Project BWR Water Chemistry Guidelines – 2004 Revision”. For justification of exceptions, see Water Chemistry program, B.1.2.

Enhancements

None.

Operating Experience

Of the welds included in the scope of GL 88-01, Oyster Creek had 11 welds in service with indications of IGSCC. Nine were repaired with full structural overlays (four in Core Spray, four in Recirculation and one in Shutdown Cooling). Two were inservice without repair in the Recirculation system since they were both stress improved before the inspections found IGSCC. Both of these welds in the Recirculation system have recently been re-examined using the PDI qualified UT method and no IGSCC was identified. No new indications of IGSCC have been detected by inspection during the last six (6) outages.

Oyster Creek replaced the following piping material with IGSCC resistant material: 1) All Isolation Condenser large bore piping outside the drywell (from the drywell penetrations to the isolation condensers). All new welds were stress improved. 2) All piping within the four (4) isolation condenser drywell penetrations and the two (2) RWCU system drywell penetrations which contain welds that are not inspectable. 3) The Head Cooling Spray Nozzle Assembly, the 4 inch tee and flange of the reactor vent line were replaced. Additionally, all accessible/inspectable welds inside the drywell (except RWCU system) were stress improved.

Furthermore, as a result of the improved quality of water chemistry due to the execution HWC and NWCA, reductions in inspection frequency permissible per BWRVIP-75 were implemented at Oyster Creek.

BWR Stress Corrosion Cracking aging management program activities have detected flaw indications in reactor coolant pressure boundary piping prior to loss of intended functions of the components. These indications were evaluated and where repaired as necessary in accordance with ASME Section XI. As a result Oyster Creek has no indications of IGSCC at this time.

Conclusion

The BWR Stress Corrosion Cracking aging management program provides reasonable assurance that IGSCC aging effects are adequately managed so that the intended functions of the stainless steel components in the reactor coolant pressure boundary are maintained consistent with the current licensing basis during the period of extended operation.

B.1.8 BWR PENETRATIONS

Program Description

The BWR Penetrations aging management program activities incorporate the inspection and evaluation recommendations of BWRVIP-27-A, “BWR Standby Liquid Control System/Core Plate Delta-P Inspection and Flaw Evaluation Guidelines,” and BWRVIP-49-A, “Instrument Penetration Inspection and Flaw Evaluation Guidelines,“ as well as the water chemistry recommendations of BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines”, for the standby liquid control nozzle and instrument penetrations. The program is implemented through station procedures that provide for mitigation of cracking through the water chemistry and monitoring for cracking through inservice inspection examinations. Penetration inspections are implemented through station procedures that are part of reactor internals inspection and incorporate the requirements of ASME Section XI.

NUREG-1801 Consistency

The BWR Penetrations aging management program is consistent with the ten elements of aging management program XI.M8, "BWR Penetrations," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 indicates that water chemistry control is in accordance with BWRVIP-29 for water chemistry in BWRs. BWRVIP-29 references the 1996 revision of EPRI TR-103515, "BWR Water Chemistry Guidelines." The Oyster Creek water chemistry programs are based on BWRVIP-130, which is the 2004 revision of "BWR Water Chemistry Guidelines. For justification of exceptions to the water chemistry program see the Water Chemistry aging management program, B.1.2 .

Additionally, NUREG-1801 program XI.M9 references ASME Section XI, Table IWB 2500-1 (2001 edition, including the 2002 and 2003 Addenda). Oyster Creek ISI program is based on the 1995 (including 1996 Addenda) version of ASME Section XI. For justification of exceptions to the ISI program see the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program, B1.1.

Enhancements

None.

Operating Experience

OC is currently in its fourth ISI inspection interval. In the history of the Oyster Creek ISI program no evidence of instrument penetration or standby liquid control nozzle cracking has been found. This provides evidence that the Water

Chemistry program has been effective in minimizing the effects of stress corrosion cracking in the instrument and standby liquid control penetrations.

The same inspection and testing methodologies are used for the BWR penetrations as are used for other reactor internals. These processes have detected cracking in other vessel internals components, as described in the operating experience of the BWR Vessel Internals program, B.1.9.

Conclusion

The BWR Penetrations aging management program provides reasonable assurance that the aging effects of cracking are adequately managed so that the intended functions of instrument penetrations and the standby liquid control system nozzles are maintained consistent with the current licensing basis during the period of extended operation.

B.1.9 BWR VESSEL INTERNALS

Program Description

The Oyster Creek BWR Vessel Internals program manages the effects of cracking initiation and growth of reactor pressure vessel internals through condition monitoring activities that consist of examinations implemented through station procedures consistent with the recommendations of the BWRVIP guidelines, as well as the requirements of ASME Section XI. The BWR Vessel Internals aging management program also mitigates the effects of stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), and irradiation assisted stress corrosion cracking (IASCC) in reactor pressure vessel internals through water chemistry activities that are implemented through station procedures and are consistent with the guidelines of BWRVIP-130: " BWR Vessel and Internals Project BWR Water Chemistry Guidelines," 2004 Revision.

Inspections and evaluations of reactor components are consistent with the guidelines provided in the following BWRVIP reports:

- BWRVIP-18-A, BWR Core Spray Inspection and Flaw Guidelines
- BWRVIP-25, BWR Core Plate Inspection and Flaw Evaluation Guidelines
- BWRVIP-26, BWR Top guide Inspection and Flaw Evaluation Guidelines
- BWRVIP-27-A, BWRVIP Standby Liquid Control System/Core Spray/ Core Plate ΔP Inspection and Flaw Evaluation Guidelines.
- BWRVIP-38, BWR Shroud Support Inspection and Flaw Evaluation guidelines
- BWRVIP-47, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines
- BWRVIP-48, Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines.
- BWRVIP-49-A, Instrument Penetration Inspection and Flaw Evaluation Guidelines.
- BWRVIP-74-A, BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines.
- BWRVIP-76, BWR Core Shroud Inspection and Flaw Evaluation Guidelines
- BWRVIP-104, Evaluation and Recommendations to Address Shroud Support Cracking in BWRs.
- BWRVIP 41(Jet Pump) and BWRVIP-42 (LPCI Coupling) are not applicable to Oyster Creek, because Oyster Creek does not have these components.

Oyster Creek has or will complete each of the license renewal applicant action items described in the NRC safety evaluations for each of the above BWRVIP reports prior to the period of extended operation. In addition Oyster Creek will implement the guidelines of BWRVIP-139 for the steam dryer when issued.

NUREG-1801 Consistency

The BWR Vessel Internals aging management program is consistent with the ten elements of aging management program XI.M9, "BWR Vessel Internals," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 indicates that water chemistry control is in accordance with BWRVIP-29, “BWR Water Chemistry Guidelines.” BWRVIP-29 references the 1993 revision of EPRI TR-103515, "BWR Water Chemistry Guidelines." The Oyster Creek water chemistry program is based on BWRVIP-130, which is the 2004 revision of "BWR Water Chemistry Guidelines." For justification of exceptions to the water chemistry program see the Water Chemistry aging management program, B.1.2.

Additionally, NUREG-1801 program XI.M9 references ASME Section XI, Table IWB 2500-1 (2001 edition, including the 2002 and 2003 Addenda). The Oyster Creek ISI program is based on the 1995 (including 1996 Addenda) version of ASME Section XI. For justification of exceptions to the ISI program see the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD aging management program, B1.1.

Enhancements

The BWR Vessel Internals program will be enhanced to include inspections of the steam dryer in accordance with BWRVIP-139.

The fluence at the top guide has exceeded the IASCC threshold ($5x10^{20}$ n/cm2, E>1 MeV). The inspections recommended in NUREG-1801 program XI.M9 for the top guide will be added to the Oyster Creek Reactor Program. For those locations that have exceeded the IASCC fluence threshold, ten (10) percent of the top guide locations will be inspected using enhanced visual inspection technique, EVT-1 within 12 years, with one-half of the inspections (5 percent of locations) to be completed within 6 years.

Oyster Creek has roll repaired two leaking CRD stub tubes. Oyster Creek is pursuing a code case within the ASME to make these roll expansion repairs permanent. Once the ASME and the NRC approve the code case, the BWR Reactor Internals program will be revised to make these repairs permanent. If the code case is not approved, the program will be changed to use a permanent repair acceptable to the NRC.

Operating Experience

The BWR Vessel Internals aging management activities have detected aging degradation and implemented appropriate corrective actions to maintain system and component intended functions including prompt repair of degraded components prior to failure. Some site-specific examples are provided below.

In 1978 Oyster Creek identified crack indications in the Core Spray Spargers. Mechanical clamps were installed to provide structural support for identified cracks and indications in the core spray sparger. Recent inspections in 1998, 2000, 2002, and 2004 have confirmed that the repair clamps are in good condition. Inspection of the core spray piping welds has confirmed that the mitigation efforts provided by the Reactor Water Chemistry program have been successful, as no new crack indications have been found.

During the 1991 refueling outage Oyster Creek found a cracked beam on the underside of the top guide. Additional cracked beams were discovered during 1992 and 1994. The top guide is visually inspected every outage to monitor crack growth and support updating the flaw evaluation which shows that projected crack growth over the next cycle of operation will not challenge the structural integrity of the top guide. The top guide has been found to be very flaw tolerant. The results of the 2004 inspection indicate that there is no new crack growth, which indicates that the current Reactor water chemistry program mitigation efforts are successful.

In 1994 Oyster Creek installed shroud repair hardware (vertical tie rods) after cracks were discovered in the shroud circumferential welds. Subsequent inspections of the repair hardware have confirmed that the tie rods are in good condition and continue to provide reliable structural support for the shroud. Inspections of shroud vertical welds completed in 1998 and 2002 have confirmed that the Reactor water chemistry program mitigation efforts have been successful, as no new crack indications have been observed.

During the 2000 refueling outage RPV pressure test, leakage was observed from two CRD housing penetrations at the reactor bottom head interface. A roll expansion repair design was completed on the two CRD housings to stop the leaks. Subsequent inspections in 2002 and 2004 did not find evidence of any CRD housing penetration leakage.

Oyster Creek has been inspecting the steam dryer every refueling outage for many years. Cracks were first identified on a lower bank brace in 1983. Weld repairs of the lower bank brace were made in 1983 and again in 1986. A different repair method “Stop drilling” was implemented in 1996 to mitigate the cracks. Subsequent inspections indicate these measures have been successful in arresting crack growth. In 2002 minor indications on a lifting lug and a section of the skirt were found. These indications did not affect the structural integrity of the steam dryer and were dispositioned by engineering analysis to use-as-is.

The BWR Reactor Internals program at Oyster Creek was recently enhanced in a few key areas based on recommendations identified during a 2003 self-assessment and as a result of an INPO BWRVIP Review Visit performed in late 2003. Two examples of these enhancements are (1) that periodic inspections have been added for the shroud lug-clevis assemblies and (2) monthly moisture carryover readings are now taken to monitor Steam Dryer performance. Oyster Creek monitors quarterly program performance and effectiveness through program health reports and periodically performs self-assessments.

Response to Applicant’s Action Items

The following table addresses the license renewal application action items identified in the corresponding NRC safety evaluation (SE) for each of the listed BWRVIP reports listed in the program scope section above. BWRVIP-76 and BWRVIP-104 is not included in the table, as these reports have not received NRC review and approval to date. In addition, BWRVIP-42 was reviewed and is not applicable as described in the following table. Each of the NRC Safety Evaluations includes three common applicant action items. If the Oyster Creek response to each common action item is the same, it is addressed only once in the following table. For those SEs that contain additional applicant action items, the Oyster Creek response is provided separately following the responses to the three common action items.

Action Item Description	OCGS Response
Common Action Items from BWRVIP-18, -25, -26, -27, -38, -47, -48, -49	
BWRVIP-All (1) The license renewal applicant is to verify that its plant is bounded by the report. Further, the renewal applicant is to commit to programs described as necessary in the BWRVIP reports to manage the effects of aging during the period of extended operation. Applicants for license renewal will be responsible for describing any such commitments and identifying how such commitments will be controlled. Any deviations from the aging management programs within these BWRVIP reports described as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the components or other information presented in the report, such as materials of construction, will have to be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).	The BWRVIP reports applicable to Oyster Creek have been reviewed and verified that Oyster Creek is bounded by the reports. Additionally, Oyster Creek commits to programs described as necessary in the BWRVIP reports to manage the effects of aging during the period of extended operations. If, upon review of a BWRVIP approved guideline, it is determined that known exceptions to full compliance are warranted, the NRC will be notified of the exception within 45 days of the receipt of NRC final approval of the guideline.
BWRVIP-All (2) 10CFR54.21(d) requires that an FSAR supplement for the facility contain a summary description of the programs and activities for managing the effects of aging and the evaluation of TLAAs for the period of extended operation. Those applicants for license renewal referencing the applicable BWRVIP report shall ensure that the programs and activities specified as necessary in the applicable BWRVIP reports are summarily described in the FSAR supplement.	The FSAR supplements for Oyster Creek are included as Appendix A of the LRA and include a summary of the programs and activities specified as necessary for the BWRVIP program.

Action Item Description	OCGS Response
BWRVIP-All (3) 10CFR 54.22 requires that each application for license renewal include any technical specification changes (and the justification for the changes) or additions necessary to manage the effects of aging during the period of extended operation as part of the renewal application. The applicable BWRVIP reports may state that there are no generic changes or additions to technical specifications associated with the report as a result of its aging management review and that the applicant will provide the justification for plant-specific changes or additions. Those applicants for license renewal referencing the applicable BWRVIP report shall ensure that the inspection strategy described in the reports does not conflict with or result in any changes to their technical specifications. If technical specification changes or additions do result, then the applicant must ensure that those changes are included in its application for license renewal.	There have been no technical specification changes identified for Oyster Creek based upon the BWRVIP reports.
Additional Action Items	
BWRVIP-18 Core Spray Internals Inspection and Flaw Evaluation Guidelines	
BWRVIP-18 (4) Applicants referencing the BWRVIP-18 report for license renewal should identify and evaluate any potential TLAA issues which may impact the structural integrity of the subject RPV internal components.	There were no TLAA issues identified for the Oyster Creek internal core spray components.
BWRVIP-25 Core Plate Inspection and Flaw Evaluation Guidelines	
BWRVIP-25 (4) Due to susceptibility of the rim hold-down bolts to stress relaxation, applicants referencing the BWRVIP-25 report for license renewal should identify and evaluate the projected stress relaxation as a potential TLAA issue.	This issue is not applicable to Oyster Creek as it has core plate wedges installed.
BWRVIP-25 (5) Until such time as an expanded technical basis for not inspecting the rim hold-down bolts is approved by the staff, applicants referencing the BWRVIP-25 report for license renewal should continue to perform inspections of the rim hold-down bolts.	This issue is not applicable to Oyster Creek because it has core plate wedges installed.

Action Item Description	OCGS Response
BWRVIP-26 Top Guide Inspection and Flaw Evaluation Guidelines	
BWRVIP-26 (4) Due to IASCC susceptibility of the subject safety-related components, applicants referencing the BWRVIP-26 report for license renewal should identify and evaluate the projected accumulated neutron fluence as a potential TLAA issue.	Oyster Creek has determined that the neutron fluence threshold for IASCC susceptibility has been exceeded. No TLAA has been identified. Oyster Creek is committed to following the Top Guide inspection recommendations described in NUREG-1801, XI.M9. Oyster Creek will perform augmented inspections for the top guide similar to the inspections of Control Rod Drive Housing (CRDH) guide tubes. The sample size and frequency is a 10% sample of the total population within 12 years; one half (5%) to be completed within six years. The method of examination is an enhanced visual examination (EVT-1). The top guide inspections will focus on the high fluence region.
BWRVIP-27 Standby Liquid Control System/Core Plate dP Internals Inspection and Flaw Evaluation Guidelines	
BWRVIP-27 (4) Due to the susceptibility of the subject components to fatigue, applicants referencing the BWRVIP-27 report for license renewal should identify and evaluate the projected fatigue cumulative usage factors as a potential TLAA issue.	There are no TLAA issues identified for Oyster Creek for BWRVIP-27 standby liquid control system.
BWRVIP-42 LPCI Coupling Inspection and Flaw Evaluation Guidelines	
BWRVIP-42 (4) Applicants referencing the BWRVIP-42 report for license renewal should identify and evaluate any potential TLAA issues which may impact the structural integrity of the subject RPV internal components.	This issue is not applicable for Oyster Creek as it is a BWR2 design and does not have a low-pressure coolant injection (LPCI) line.
BWRVIP-42 (5) The BWRVIP committed to address development of the technology to inspect inaccessible welds and to have the individual LR applicant notify the NRC of actions planned. Applicants referencing BWRVIP-42 report for license renewal should identify the action as open and to be addressed once the BWRVIP response to this issue has been reviewed and accepted by the staff.	This issue is not applicable for Oyster Creek as it is a BWR2 design and does not have a low-pressure coolant injection (LPCI) line.

Action Item Description	OCGS Response
BWRVIP-47, BWR Lower Plenum Inspection and Flaw Evaluation Guidelines	
BWRVIP-47 (4) Due to fatigue of the subject safety-related components, applicants referencing the BWRVIP-47 report for LR should identify and evaluate the projected CUF as a potential TLAA issue.	There are no TLAA issues identified for Oyster Creek for BWRVIP-47.
BWRVIP-74-A , BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines	
BWRVIP-74-A (4) The staff is concerned that leakage around the reactor vessel seal rings could accumulate in the VFLD lines, cause an increase in the concentration of contaminants and cause cracking in the VFLD line. The BWRVIP-74 report does not identify this component as within the scope of the report. However, since the VFLD line is attached to the RPV and provides a pressure boundary function, LR applicants should identify an AMP for the VFLD line.	The Oyster Creek vessel flange leak detection line is identified as a Class 1 line and is visually inspected during reactor cavity flood up each refueling outage as part of the ASME Section XI program. .
BWRVIP-74-A (5) LR applicants shall describe how each plant-specific aging management program addresses the following elements: (1) scope of program, (2) preventative actions, (3) parameters monitored and inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8) confirmation process, (9) administrative controls, and (10) operating experience.	There is no plant unique Aging Management program credited for managing aging of the reactor vessel.
BWRVIP-74-A (6) The staff believes inspection by itself is not sufficient to manage cracking. Cracking can be managed by a program that includes inspection and water chemistry. BWRVIP-29 describes a water chemistry program that contains monitoring and control guidelines for BWR water that is acceptable to the staff. BWRVIP-29 is not discussed in the BWRVIP-74 report. Therefore, in addition to the previously discussed BWRVIP reports, LR applicants shall contain water chemistry programs based on monitoring and control guidelines for reactor water chemistry that are contained in BWRVIP-29.	The Oyster Creek BWR Stress Corrosion Cracking Program, B.1.7, and the Reactor Internals Program, B.1.9, includes water chemistry controls as a preventative measure. The Oyster Creek Reactor Water Chemistry Control Program that meets the requirements of the latest BWRVIP guidelines, BWRVIP-130 to help ensure the long-term integrity of the reactor vessel and internals.

Action Item Description	OCGS Response
BWRVIP-74-A (7) LR applicants shall identify their vessel surveillance program, which is either an ISP or plant-specific-in-vessel surveillance program, applicable to the LR term.	The Reactor Vessel Surveillance Program for Oyster Creek will be the Integrated Surveillance Program (ISP) for the license renewal term.
BWRVIP-74-A (8) LR applicants should verify that the number of cycles assumed in the original fatigue design is conservative to assure that the estimated fatigue usage for 60 years of plant operation is not underestimated. The use of alternative actions for cases where the estimated fatigue usage is projected to exceed 1.0 will require case-by-case staff review and approval. Further, a LR applicant must address environmental fatigue for the components listed in the BWRVIP-74 report for the LR period.	Thermal fatigue (including discussions of cycles, projected cumulative usage factors, environmental factors, etc.) is evaluated as a TLAA in Chapter 4 of the LRA. Environmental fatigue for those components described in NUREG-6260 are addressed in the fatigue analysis discussed in 4.6 of the LRA.
BWRVIP-74-A (9) Appendix A to the BWRVIP-74 report indicates that a set of P-T curves should be developed for the heat-up and cool-down operating conditions in the plant at a given EFPY in the LR period.	The development of P-T curves for Oyster Creek for the license renewal period is described as a TLAA in Section 4.2 of the LRA.
BWRVIP-74-A (10) To demonstrate that the beltline materials meet the Charpy USE criteria specified in Appendix B of the report, the applicant shall demonstrate that the percent reduction in Charpy USE for their beltline materials are less than those specified for the limiting BWR/3-6 plates and the non-Linde 80 submerged arc welds and that the percent reduction in Charpy USE for their surveillance weld and plate are less than or equal to the values projected using the methodology in RG 1.99, Revision 2.	The discussion of Charpy upper shelf energy (USE) for Oyster Creek for the LR period is described as a TLAA in Section 4.2 of the LRA.
BWRVIP-74-A (11) To obtain relief from the in-service inspection of the circumferential welds during the LR period, the BWRVIP report indicates each licensee will have to demonstrate that (1) at the end of the renewal period, the circumferential welds will satisfy the limiting conditional failure frequency for circumferential welds in the Appendix E for the staff's July 28, 1998, SER, and (2) that they have implemented operator training and established procedures that limit the frequency of cold overpressure events to the amount specified in the staff's FSER.	The discussion of the relief from the in-service inspection of the circumferential welds for Oyster Creek for the LR period is described in Section 4.2 of the LRA.

Action Item Description	OCGS Response
BWRVIP-74-A (12) As indicated in the staff's March 7, 2000, letter to Carl Terry, a LR applicant shall monitor axial beltline weld embrittlement. One acceptable method is to determine that the mean RT_{NDT} of the limiting axial beltline weld at the end of the period of extended operation is less than the values specified in Table 1 of this FSER.	Refer to the discussion of the RPV Axial Weld Failure Probability TLAA in Section 4.2 of the LRA.
BWRVIP-74-A (13) The Charpy USE, P-T limit, circumferential weld and axial weld RPV integrity evaluations are all dependent upon the neutron fluence. The applicant may perform neutron fluence calculations using staff approved methodology or may submit the methodology for staff review. If the applicant performs the neutron fluence calculation using a methodology previously approved by the staff, the applicant should identify the NRC letter that approved the methodology.	The neutron fluence calculation methodology for Oyster Creek is consistent with RG 1.190.
BWRVIP-74-A (14) Components that have indications that have been previously analytically evaluated in accordance with sub-section IWB-3600 of Section XI to the ASME Code until the end of the 40-year service period shall be re-evaluated for the 60-year service period corresponding to the LR term.	Oyster Creek has performed flaw evaluations for previously identified indications. These are discussed in Section 4.7.4 of the LRA.

Conclusion

The BWR Vessel Internals aging management program provides reasonable assurance that stress corrosion cracking, intergranular stress corrosion cracking, and irradiation assisted stress corrosion cracking aging effects are adequately managed so that the intended functions of BWR vessel internals within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.10 THERMAL AGING AND NEUTRON IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS)

Program Description

The aging management program for Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless steel (CASS) is a new program that will provide for aging management of CASS reactor internal components within the scope of license renewal. The program will be implemented prior to the period of extended operation.

The program will include a component specific evaluation of the loss of fracture toughness. A supplemental inspection will be performed for those components where loss of fracture toughness may affect function of the component, using the criteria provided in NUREG-1801 Aging Management Program, XI.M13. This inspection will ensure the integrity of the CASS components exposed to the high temperature and neutron fluence present in the reactor environment.

NUREG-1801 Consistency

The new aging management program for Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless steel (CASS) is consistent with the ten elements of aging management program XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The aging management program for thermal aging and neutron irradiation embrittlement of cast austenitic stainless steel (CASS) is a new program, and therefore, no operating experience exists.

Conclusion

The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless steel (CASS) aging management program will provide reasonable assurance that thermal aging and neutron irradiation embrittlement aging effects are adequately managed so that the intended functions of cast austenitic stainless steel (CASS) components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.11 FLOW-ACCELERATED CORROSION

Program Description

The Flow-Accelerated Corrosion (FAC) aging management program is based on EPRI guidelines in NSAC-202L-R2, “Recommendations for an Effective Flow Accelerated Corrosion Program.” The program predicts, detects, and monitors wall thinning in piping, fittings, valve bodies, and Feedwater Heaters due to FAC.

Analytical evaluations and periodic examinations of locations that are most susceptible to wall thinning due to FAC are used to predict the amount of wall thinning in pipes, fittings, and Feedwater Heater shells. Program activities include analyses to determine critical locations, baseline inspections to determine the extent of thinning at these critical locations, and follow-up inspections to confirm the predictions. Inspections are performed using ultrasonic, radiographic, visual or other approved testing techniques capable of detecting wall thinning. Repairs and replacements are performed as necessary.

NUREG-1801 Consistency

The Flow-Accelerated Corrosion aging management program is consistent with the ten elements of aging management program XI.M17, "Flow-Accelerated Corrosion," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

Operating experience of Flow-Accelerated Corrosion aging management program activities has shown that the program can determine susceptible locations for flow accelerated corrosion, predict the component degradation, and detect the wall thinning in piping, valves, and Feedwater Heater shells due to flow-accelerated corrosion. In addition, the program provides for reevaluation, repair or replacement for locations where calculations indicate an area will reach minimum allowable thickness before the next inspection. Periodic self-assessments of the program have been performed which have identified opportunities for program improvements.

In 2000, inspections of the “C” Feedpump Minimum Recirculation line showed that several 90-degree elbows experienced significant wear. Similar wear was found on several 45-degree elbows. As a result of these inspections, approximately 25 feet of 4” pipe, one 90-degree elbow, and three 45-degree elbows were replaced with chrome-moly material.

During Cycle 17, UT Inspections were performed on the High-Pressure (HP) Feedwater Heater (FWH) shells. These inspections were driven by the Point Beach FWH shell rupture event and other industry experience as described in SEN 199 and NRC Information Notice 99-19. Results of the inspections showed wall thinning on all three HP FWH shells. Two areas on the “A” HP FWH required immediate repair. Other identified degradation was evaluated and determine to be acceptable through the remainder of the operating cycle at which time further inspections and repairs were performed.

There have been a number of steam leaks associated with flash tank and drain tank piping and attached piping. A Condition Report was initiated to determine why the FAC scope and inspection frequency did not prevent these failures from occurring. As documented in the Condition Report response, the Corporate FAC Program Manager performed an Oversight Self-Assessment of the Flow Accelerated Corrosion (FAC) Program at Oyster Creek during February 2003. Two deficiencies in the program were identified: 1) The System Susceptibility Evaluation did not meet EPRI or procedural requirements and 2) plant model input to the FAC Program software tool, CHECWORKS, contained a number of errors and omissions. These deficiencies were identified as the primary reasons the FAC program has missed identifying components that developed leaks as a result of Flow Accelerated Corrosion. A FAC program improvement project was implemented to correct the deficiencies. The project was completed during August 2003. As a result of the improvement project, the risk of a FAC failure in unidentified susceptible lines has been reduced, and FAC inspections and outage inspection costs and time have been optimized since the tools are now available to assist in selecting the right outage inspection scope.

Conclusion

The Flow-Accelerated Corrosion (FAC) aging management program provides reasonable assurance that wall thinning aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.12 BOLTING INTEGRITY

Program Description

The Bolting Integrity aging management program provides for condition monitoring of pressure retaining bolted joints within the scope of license renewal. The Bolting Integrity program incorporates NRC and industry recommendations delineated in NUREG-1339, “Resolution of Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants”, EPRI TR-104213, “Bolted Joint Maintenance & Applications Guide,” and EPRI NP-5769, “Degradation and Failure of Bolting in Nuclear Power Plants,” as part of the comprehensive corporate component pressure retaining bolting program. The program manages the loss of bolting function, including loss of material, cracking, and loss of preload aging effects, by performing visual inspections for pressure retaining bolted joint leakage. Inspection of ASME Class 1, 2 and 3 components is conducted in accordance with ASME Section XI. Non-Class 1, 2 and 3 component inspections rely on detection of visible leakage during routine observations and equipment maintenance activities. Procurement controls and installation practices, defined in plant procedures, ensure that only approved lubricants and torque are applied. The activities are implemented through station procedures.

A 193 Gr. B7 bolting is commonly used in ASME XI, Class 1, 2 & 3 piping systems and components. A193 Gr. B7 is a chromium-molybdenum material that is generally not susceptible to stress corrosion cracking. The bolting is considered low strength bolting at Oyster Creek, and is used in applications that do not require high strength bolting. This is documented in NRC Safety Evaluation for ISI relief request R-15, which addresses leaking of bolted flanges dated October 3, 1996, stated that Oyster Creek has no high strength bolting, except for CRD System.

NUREG-1801 Consistency

The Bolting Integrity aging management program is consistent with the ten elements of aging management program XI.M18, "Bolting Integrity," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 indicates that the program covers all bolting within the scope of license renewal including component support and structural bolting. The Oyster Creek Bolting Integrity program does not address structural or component support bolting. The aging management of structural bolting is addressed by the Structures Monitoring Program, B.1.31 and ASME Section XI, Subsection IWE, B.1.27, addresses Primary Containment pressure bolting. Aging management of ASME Section XI Class 1, 2, and 3 and Class MC support members, is addressed by the ASME Section XI, Subsection IWF program, B.1.28.

Enhancements

None.

Operating Experience

Oyster Creek has experienced isolated cases of loss of bolting function attributed to loss of material. Review of operating history has not identified any cracking of stainless steel bolting. Reactor coolant pressure boundary leakage due to boric acid induced degradation is not applicable since the station is a BWR. In all cases, the existing inspection and testing methodologies have discovered the deficiencies and corrective actions were implemented prior to loss of system or component intended functions.

Conclusion

The Bolting Integrity aging management program provides reasonable assurance that aging effects are adequately managed so that the intended functions of bolting for pressure retaining joints within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.13 OPEN-CYCLE COOLING WATER SYSTEM

Program Description

The Open-Cycle Cooling Water System (OCCWS) aging management program is an existing program that manages aging of piping, piping components, piping elements and heat exchangers that are included in the scope of license renewal for loss of material and reduction of heat transfer and are exposed to raw water - salt water at Oyster Creek. Program activities include (a) surveillance and control of biofouling (including biocide injection), (b) verification of heat transfer capabilities for components cooled by the Service Water and Emergency Service Water systems, (c) inspection and maintenance activities, (d) walkdown inspections, and (e) review of maintenance, operating and training practices and procedures. Inspections may include visual, UT, and Eddy Current Testing (ECT) methods. The OCCWS Program is based on the recommendations of NRC Generic Letter 89-13.

The Service Water (SW) and Emergency Service Water (ESW) systems are performance tested for acceptable flow rates, operating temperatures and operating pressures. Volumetric (UT) inspections are performed at various aboveground locations of the SW and ESW piping, including inspections performed outside at the intake structure. Results of the inspections are documented and continually analyzed to determine maximum expected corrosion rates and susceptible locations for future inspections. The aboveground inspection locations are representative of the same internal coatings, environments and aging effects present in the buried sections of the ESW and SW system piping. Therefore the inspection program adequately monitors the conditions of the ESW and SW system internal piping, including the buried piping.

Volumetric inspections of aboveground ESW and SW piping that is original to the plant design are performed at a minimum of 10 locations every 2 years, based on the maximum anticipated corrosion rates determined from past inspections and analyses. The results of the volumetric inspections are trended and pipe replacement is scheduled prior to predicted failure. Predicting the failure based on corrosion rates, current wall thickness, environment, and scheduling replacement of the pipe is a mitigative action to prevent leaks

For piping that has been replaced, volumetric inspections will be performed at a minimum of 4 aboveground locations every 4 years, based on the observed and anticipated performance of the new pipe. The scope of these inspections will be evaluated to include additional inspection locations as new piping is replaced in the plant.

NUREG-1801 Consistency

The Open-Cycle Cooling Water System aging management program is an existing program that is consistent with the elements of aging program XI.M20, “Open-Cycle Cooling Water System,” specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

The Open-Cycle Cooling Water aging management program will be enhanced to include:

- Volumetric inspections, for piping that has been replaced, at a minimum of 4 aboveground locations every 4 years based on the observed and anticipated performance of the new pipe.
- Specificity on inspection of heat exchangers for loss of material due to general, pitting, crevice, galvanic and microbiologically influenced corrosion in the RBCCW, TBCCW and Containment Spray preventative maintenance tasks.

Operating Experience

Oyster Creek has reviewed both industry and plant-specific operating experience relating to the OCCWS aging management program. Inspections implementing the guidance of GL 89-13 have identified deterioration, degradation and loss of material from inside the pipe.

Oyster Creek has performed evaluations to identify the buried piping with high risk of developing leaks and high consequences should leaks occur. Piping replacements are scheduled based on the risk priority, and the monitoring and inspection program assures that the piping maintains adequate wall thickness with margin prior to replacement.

The methodology for determining corrosion rates and projected service life was revised in 2002 based on analysis of station operating experience and previous inspection results. Additionally, in 2004 fifty percent of the buried ESW and 10% of the buried SW piping was replaced with new pipe and an improved coating system. A plan is in place to replace the other fifty percent of the buried ESW piping prior to 2007.

After identifying and reviewing several ESW pipe leaks and wall thinning events, a common failure mechanism (local wall thinning due to salt-water corrosion) was identified. The results were entered into the corrective action process and an operability evaluation was performed in 2003. The operability evaluation also included an evaluation of the effect of the failure mechanism on the SSC safety functions including functional thresholds and methods for detection of leaks for each of the safety functions. Additionally, the corrective action process problem resolution response included the development of an inspection plan " Topical Report 140 - ESW and Service Water System Plan ". Some of the plan's goals are to prioritize modifications and inspections based on risk and consequence of a leak, modify piping segments that pose a high risk and consequence and cannot be reasonably inspected, modify piping to allow system flexibility for future repairs and inspect piping to ensure disposition/repair prior to failure. The plan captures existing analysis, past action and future action for ESW and SW pipe.

The OCCWS aging management program is continually adjusted to account for industry and station experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

Conclusion

The OCCWS aging management program activities as enhanced will be effective in managing aging degradation for the period of extended operation by providing timely detection of aging effects and implementation of appropriate corrective actions prior to loss of system or component intended functions. Enhancements to the program will be implemented prior to entering the period of extended operation. The OCCWS aging management program has been effective in identifying and managing aging effects, including erosion and corrosion, blockage due to silt buildup, microbiological growth, mussel growth, and microbiologically influenced corrosion, prior to loss of the system intended function.

The OCCWS aging management program provides reasonable assurance that aging effects are adequately managed so that the intended functions of the OCCWS components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.14 CLOSED-CYCLE COOLING WATER SYSTEM

Program Description

The Closed-Cycle Cooling Water System aging management program is an existing program that manages aging of piping, piping components, piping elements and heat exchangers that are included in the scope of license renewal for loss of material and reduction of heat transfer and are exposed to a closed cooling water environment at Oyster Creek. The program provides for preventive, performance monitoring and condition monitoring activities that are implemented through station procedures. Preventive activities include measures to maintain water purity and the addition of corrosion inhibitors to minimize corrosion based on EPRI1007820, "Closed Cooling Water Chemistry Guidelines."

Performance monitoring provides indications of degradation in closed-cycle cooling water systems, with plant operating conditions providing indications of degradation in normally operating systems. In addition, station maintenance inspections and NDE provide condition monitoring of heat exchangers exposed to closed-cycle cooling water environments.

NUREG-1801 Consistency

The Closed-Cycle Cooling Water System aging management program is consistent with the ten elements of aging management program XI.M21, "Closed-Cycle Cooling Water System," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG 1801 refers to EPRI TR-107396 Closed Cooling Water Chemistry Guidelines 1997 Revision. Oyster Creek implements the guidance provided in EPRI 1007820 “Closed Cooling Water Chemistry Guideline, Revision 1” which is the 2004 Revision to TR-107396. EPRI periodically updates industry water chemistry guidelines, as new information becomes available. Oyster Creek has reviewed EPRI 1007820 and has determined that the most significant difference is that the new revision provides more prescriptive guidance and has a more conservative monitoring approach. EPRI 1007820 meets the same requirements of EPRI TR-107396 for maintaining conditions to minimize corrosion and microbiological growth in closed cooling water systems for effectively mitigating many aging effects.

Enhancements

None.

Operating Experience

Oyster Creek has not experienced a loss of intended function failure of components due to corrosion product buildup or through-wall loss of material for components within the scope of license renewal that are subject to closed-cycle cooling water system activities. Additionally, industry operating experience demonstrates that the use of corrosion inhibitors in closed-cycle cooling water systems that are monitored and maintained is effective in mitigating loss of material and buildup of deposits. Events have occurred where buildup of deposits resulted in degraded heat transfer in heat exchangers however this has occurred on the tube side of the heat exchangers. The tube side of the heat exchangers are exposed to raw water – salt water and are managed by the Open Cycle Cooling Water program.

In 2002 Oyster Creek increased their desired molybdate range in all of the closed cycle cooling water systems from 50-125 ppm to 200-1000 ppm. This enabled Oyster Creek to align with industry best practices.

In 2004, the pH in the TBCCW system decreased outside the Action Level 1 range for pH. A caustic add was made that returned pH back in spec within the acceptable time period for correcting an Action Level 1 CCW limit.

In addition to mitigating loss of material and buildup of deposits by maintaining water chemistry, Oyster Creek monitors the RBCCW, TBCCW and EDGCW for microbiological growth (total bacteria colonies) in accordance with EPRI1007820, "Closed Cooling Water Chemistry Guidelines." To date there have been no adverse trends associated with microbiological growth in closed cycle cooling water systems.

By improving the closed-cycle cooling water chemistry monitoring parameters, returning out of range parameters within acceptable limits in a timely manner and monitoring for microbiological growth, Oyster Creek has been effective in managing components for loss of material and reduction of heat transfer that are exposed to a closed cooling water environment. Additionally, the Closed-Cycle Cooling Water System aging management program is continually adjusted to account for industry and station experience and research. As additional operating experience is obtained, lessons learned are be used to adjust this program as needed.

Conclusion

The Closed-Cycle Cooling Water System aging management program provides reasonable assurance that loss of material, cracking, and buildup of deposits aging effects are adequately managed so that the intended functions of components exposed to closed-cycle cooling water environments within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.15 BORAFLEX RACK MANAGEMENT PROGRAM

Program Description

The Oyster Creek Nuclear Generating Station Boraflex Rack Management Program is based on manufacturer's recommendations, industry guidelines developed in response to NRC Generic Letter (GL) 96-04, and plant specific operating experience. The program employs a defense in depth strategy to detect and take appropriate actions for degraded Boraflex to ensure the 5% subcriticality margin is maintained. The program consists of condition monitoring activities that include periodic inspection of sample Boraflex coupons, in-situ testing of boron areal density using BADGER device, monitoring dissolved silica in the spent fuel storage pool and trending the results using EPRI RACKLIFE predictive code. The RACKLIFE predictive model is updated periodically and validated through the BADGER boron areal density tests. The BADGER test is conducted every 3 years.

NUREG-1801 Consistency

The Boraflex Rack Management Program is consistent with the ten elements of aging management program XI.M22, "Boraflex Monitoring," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

Blackness test is not performed. The test is replaced with boron areal density measurements using the BADGER device, which gives a better indication of Boraflex effectiveness to perform its intended function.

Enhancements

None.

Operating Experience

The Oyster Creek Boraflex Rack Management Program has been in effect since 1986 when the new high density poison racks were installed in the spent fuel storage pool. The program initially consisted of testing of sample coupons maintained in the spent fuel pool and upgraded later to include in-situ testing of boron areal density using the BADGER device. To date two BADGER tests were conducted, one in 1997, and the second in 2001. Both tests identified the presence of degradations similar to those experienced in the industry, including some areas of local dissolution of boron carbide, and formation of shrinkage-induced gaps. However, both tests show that the average areal density of Boraflex is well in excess of the minimum certified areal density by the manufacturer. The in-situ areal density test using the BADGER device has proved effective in identifying unacceptable degradation prior to a loss of an intended function.

Conclusion

The Oyster Creek Boraflex Rack Management Program ensure that the effects of Boraflex aging are adequately managed so that there is a reasonable assurance its intended function is maintained consistent with the current licensing basis during the period of extended operation.

B.1.16 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD (RELATED TO REFUELING) HANDLING SYSTEMS

Program Description

This aging management program provides for periodic visual inspections of overhead heavy load and light load (related to refueling) handling systems. The program is implemented through station procedures and is relied upon to manage loss of material of cranes and hoists structural components, including the bridge, the trolley, bolting, lifting devices, and the rail system within the within the scope of 10 CFR 54.4. Bolting is monitored for loss of material, and loss of preload by inspecting for missing, detached or loosened bolts. The program relies on procurement controls and installation practices, defined in plant procedures, to ensure that only approved lubricants and proper torque are applied consistent with NUREG-1801 bolting integrity program. Inspection frequency is annually for cranes and hoists that are accessible during plant operation and every 2 years for cranes and hoists that are only accessible during refueling outages.

NUREG-1801 Consistency

With enhancements, the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems aging management program is consistent with the ten elements of aging management program XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 indicates that the number and magnitude of lifts made by the crane are reviewed. The Oyster Creek program does not require tracking of the number and magnitude of lifts. Administrative controls are implemented to ensure that only allowable loads are handled. As discussed in the Crane Load Cycle Limit time-limited aging analysis (TLAA), the projected number of load cycles for 60 years for the reactor building crane is 2800 cycles. The projected number of load cycles for 60 years for the turbine building and heater bay cranes are 2000 and 600 cycles respectively. The reactor building crane, the turbine building and the heater bay cranes were designed for 20,000 to 100,000 load cycles. Thus tracking the number of lifts, or load cycles, is not required because the projected number of crane load cycles for 60 years is significantly lower than the design value.

Enhancements

- Increase the scope of the program to include additional hoists identified as potential Seismic II/I concern, 10CFR54.4(a)(2)

- The program will provide for specific inspections for rail wear.

- The program will provide for specific inspections for corrosion of cranes and hoists structural components, including the bridge, the trolley, bolting, lifting devices, and the rail system

Enhancements will be implemented prior to the period of extended operation.

Operating Experience

The plant operating and maintenance experience review identified no incidents of failure of passive cranes and hoists structural components due to age related degradations. Minor non-age related degradations have been identified in non-load bearing components during the inspections. The degradations were repaired and documented in accordance with the corrective active process.

Conclusion

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems aging management program provides reasonable assurance that loss of material and loss of preload aging effects are adequately managed so that the intended functions of cranes and hoists structural components within the scope of license renewal are maintained consistent with current licensing basis (CLB) during the period of extended operation.

B.1.17 COMPRESSED AIR MONITORING

Program Description

Compressed Air Monitoring is an existing aging management program that ensures dewpoint, particulates, and suspended hydrocarbons are kept within the specified limits for the portions of the instrument air system within the scope of license renewal. Activities consist of yearly air quality monitoring, pressure decay testing at intervals not exceeding five years and visual inspections. The activities are consistent with the Oyster Creek response to NRC Generic Letter 88-14, “Instrument Air Supply Problems” and utilize guidance and standards provided by INPO SOER 88-01, EPRI TR-108147 and ASME OM-S/G-1998, Part 17. Testing and monitoring activities are implemented through station procedures.

NUREG-1801 Consistency

The Compressed Air Monitoring aging management program is consistent with the ten elements of aging management program XI.M24, "Compressed Air Monitoring," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

Reliability of the Oyster Creek Instrument air system has improved since the implementation of GL 88-14 activities and industry guidance. The Compressed Air Monitoring program has implemented new industry air quality standard, ISA-S7.0.01-1996, consistent with NUREG 1801 and replacement dryers have increased air quality as indicated by air quality test results and dewpoint monitoring.

Conclusion

The Compressed Air Monitoring aging management program tests and inspections provide reasonable assurance that aging effects are adequately managed so that the intended functions of the instrument air components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.18 BWR REACTOR WATER CLEANUP SYSTEM

Program Description

The BWR Reactor Water Cleanup System program describes the requirements for augmented inservice inspection (ISI) for stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC) on stainless steel Reactor Water Cleanup System piping welds outboard of the second containment isolation valves. The program includes inspection guidelines delineated in NUREG-0313, Rev. 2 and NRC Generic Letter (GL) 88-01. The program also provides for water chemistry control in accordance with BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines” to minimize the potential of crack initiation and growth due to SCC or IGSCC.

In accordance with Generic Letter (GL) 88-01, Supplement 1, upgrades and enhancements have been implemented to the RWCU isolation valves in accordance with Generic Letter 89-10 to ensure that the valves will produce sufficient thrust to perform their design basis function, which is the isolation of containment in the event of a pipe break downstream of the valves. Based on these upgrades/enhancements, an effective Hydrogen Water Chemistry program, and the complete lack of cracking found during any of the RWCU piping weld inspections under Generic Letter 88-01, all inspection requirements for the portion of the RWCU System outboard of the second containment isolation valves have been eliminated.

Reactor coolant system (RCS) chemistry activities that support the aging management program for the RWCU System consist of preventive measures that are used to manage cracking in license renewal components exposed to reactor water and steam. RCS chemistry activities provide for monitoring and controlling RCS water chemistry using Oyster Creek procedures and processes based on the 2004 revision to EPRI TR-103515, which is BWRVIP-130: “BWR Vessel and Internals Project BWR Water Chemistry Guidelines.” The BWR Water Chemistry Guidelines include information to develop proactive plant-specific water chemistry programs to minimize IGSCC.

NUREG-1801 Consistency

The BWR Reactor Water Cleanup System aging management program is consistent with the ten elements of aging management program XI.M25, "BWR Reactor Water Cleanup System," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG-1801 indicates that water chemistry control is in accordance with BWRVIP-29, “EPRI Report TR-103515-R1, BWR Water Chemistry Guidelines" dated 1996. The Oyster Creek water chemistry program is based on BWRVIP-130, “BWR Vessel and Internals Project BWR Water Chemistry Guidelines” dated 2004. For justification of exceptions, see Water Chemistry program, B.1.2.

Enhancements

None.

Operating Experience

No indications of IGSCC have been found in RWCU, which is not stress improved.

The following mitigative actions have also been implemented to reduce the susceptibility of the RWCU System to IGSCC:

- Improved water chemistry guidelines (BWR Water Chemistry Guidelines 2004 Revision (BWRVIP-130))
- Hydrogen Water Chemistry (HWC)
- Noble Metals Chemical Addition (NMCA)

Conclusion

In accordance with Generic Letter (GL) 88-01, Supplement 1, upgrades and enhancements have been implemented to the RWCU isolation valves in accordance with Generic Letter 89-10 to ensure that the valves will produce sufficient thrust to perform their design basis function, which is the isolation of containment in the event of a pipe break downstream of the valves. Based on these upgrades/enhancements, an effective Hydrogen Water Chemistry program, and the complete lack of cracking found during any of the RWCU piping weld inspections under Generic Letter 88-01, all inspection requirements for the portion of the RWCU System outboard of the second containment isolation valves have been eliminated. Reactor Coolant System (RCS) chemistry activities provide for monitoring and controlling RCS water chemistry using Oyster Creek procedures and processes based on BWRVIP-130, “BWR Vessel and Internals Project BWR Water Chemistry Guidelines.” The BWR Water Chemistry Guidelines include information to develop proactive plant-specific water chemistry programs to minimize IGSCC.

B.1.19 FIRE PROTECTION

Program Description

The Fire Protection program provides for aging management of various fire protection related components within the scope of license renewal.

The program provides for visual inspections of fire barrier penetration seals for signs of degradation, such as change in material properties, cracking, and loss of material, through periodic inspection, surveillance and maintenance activities. The inspections are implemented through recurring task work orders and station procedures.

The program provides for visual inspection of fire barrier walls, ceilings and floors in structures within the scope of license renewal for the aging effects of cracking, and loss of material. The inspections are implemented through recurring task work orders and station procedures.

The program provides for periodic visual inspections of fire doors for holes in skin, wear, or missing parts. Fire door clearances are checked during periodic inspections and when fire doors and components are repaired or replaced. Additionally, periodic functional tests of fire doors are implemented through recurring task work orders and station procedures.

The program will provide for managing loss of material aging effects for the fuel oil systems for the Oyster Creek diesel-driven fire pumps by the performance of periodic fuel oil system surveillance tests that are implemented through recurring task work orders and station procedures.

The program will provide for aging management of external surfaces of the Oyster Creek carbon dioxide and halon fire suppression system components for corrosion and mechanical damage through periodic operability tests based on NFPA codes and visual inspections. Testing and inspections are implemented through recurring task work orders and station procedures.

NUREG-1801 Consistency

The Fire Protection program is consistent with the ten elements of aging management program XI.M26, "Fire Protection," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG-1801 indicates that a periodic function test and visual inspection performed at least once every six months detects degradation of the halon and carbon dioxide fire suppression systems before the loss of the component intended function. The Oyster Creek halon and carbon dioxide fire suppression systems each undergo a system operability and flow test every 18 months. The halon system storage tank is verified for weight, level and pressure every 6 months. The carbon dioxide system surveillance verifies the tank charge once per week, and valve alignment once per month. These frequencies are considered sufficient to ensure system availability and operability based on station operating history that indicates no occurrence of aging related events that have adversely affected system operation.

Enhancements

- The program will provide for inspection for corrosion and mechanical damage on external surfaces of piping and components for the Oyster Creek halon and carbon dioxide fire suppression systems.
- The program will provide specific guidance for examining the fire pump diesel fuel supply systems for corrosion during pump tests.
- The program will provide additional inspection guidance for degradation of fire barrier walls, ceilings, and floors such as spalling and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates.

Enhancements will be implemented prior to the period of extended operation.

Operating Experience

The Fire Protection program has been effective in identifying aging effects and taking appropriate corrective action.

Minor degradation such as minor cracks have been detected in concrete components in structures within the scope of license renewal. The observed degradation was evaluated and dispositioned based on program acceptance criteria and in accordance with the corrective action process.

The Oyster Creek experience with fire barrier penetration seals is consistent with the industry experience. Silicone foam fire barrier penetration seals are used at Oyster Creek.

Oyster Creek has experienced fire door component degradation due to wear, loss of material due to corrosion, and physical damage. Mitigating actions have been taken as appropriate.

Oyster Creek operating experience has shown no loss of material on the external surfaces of components in the halon and carbon dioxide systems that have adversely affected system operation.

The Oyster Creek diesel-driven fire pump fuel oil systems have experienced minor system events that have been detected and corrected in a timely manner. These events were identified and corrected prior to loss of intended function of the fire pumps. There have been no reports of loss of material or flow blockage of the fuel oil subsystems.

Conclusion

The Fire Protection program covers various fire protection related components within the scope of license renewal including fire barrier doors, walls, ceilings, floors, and penetration seals. It also covers external surfaces of the halon and carbon dioxide fire suppression system components. In addition, the program covers the fuel oil systems for the diesel-driven fire pumps. The Fire Protection aging management program provides reasonable assurance that the cracking, loss of material and wear aging effects are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.20 FIRE WATER SYSTEM

Program Description

The Fire Water System program will manage identified aging effects for the water-based fire protection system and associated components, through the use of periodic inspections, monitoring, and performance testing. The program includes preventive measures and inspection activities to detect aging effects prior to loss of intended functions. System functional tests, flow tests, flushes and inspections are performed in accordance with guidance from NFPA standards. Fire system main header flow tests are conducted at least once every three years. Hydrant flushing and inspections are conducted at least once every twelve months. The condition of the fire pumps is confirmed once every 18 months by performance of a pump functional test. The redundant water storage tank is inspected once every 5 years. Sprinkler system inspections are performed at least once every refueling outage. The fire water system is maintained at the required normal operating pressure and monitored such that a loss of system pressure is immediately detected and corrective actions initiated. Periodic water samples will be tested to detect presence of microbiologically influenced corrosion. The program will be enhanced to include volumetric inspections using appropriate techniques on system piping to monitor pipe wall thickness and evaluate internal pipe conditions. The system flow testing, visual inspections and volumetric inspections assure that the aging effects of reduction of heat transfer and loss of material due to corrosion, microbiologically influenced corrosion (MIC), or biofouling are managed such that the system intended functions are maintained.

NUREG-1801 Consistency

The Fire Water System aging management program is consistent with the ten elements of aging management program XI.M27, "Fire Water System," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

The Fire Water System program will be enhanced to include:

- Periodic non-intrusive wall thickness measurements of selected portions of the fire water system at intervals that do not exceed every 10 years

- Periodic water sampling of the fire water system for the presence of MIC, at intervals not to exceed every 5 years

- Sampling of sprinklers in accordance with NFPA 25, “Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,” and submitting the samples to a testing laboratory prior to the sprinklers being in service 50 years. Subsequent testing is at intervals that do not exceed every 10 years

- Visual inspection of the redundant fire water storage tank heater during tank internal inspections

Enhancements will be implemented prior to the period of extended operation, except sprinkler head inspections that will begin prior to sprinklers being in service 50 years.

Operating Experience

In 2003, a leak was discovered in a small diameter cooling water line associated with the #2 diesel driven fire pump. The line comes off of the 10" pump discharge line, and provides cooling water to the diesel engine when the engine driven pump is operating. The pump is normally in standby, and is operated during pump testing. The leak was discovered during a pump performance test. The leak did not render the system, pump or engine inoperable, and the line was subsequently replaced. The cause of the leak was attributed to MIC and a combination of highly turbulent flow in the line and the stagnant lay-up conditions when the pump is not operating. The cooling water line on the #1 diesel driven fire pump was subsequently inspected using NDE techniques, and wall thinning was found. The extent of wall thinning did not render the pump inoperable, and the line is scheduled for replacement.

In 2002, a hydrant was identified with significant leakage below ground when operated. Problem was discovered during the hydrant flush surveillance activity. Hydrant was declared inoperable, but did not affect the rest of the system and was also considered available for use in an emergency. Hydrant was replaced with a new hydrant.

The pump performance testing, hydrant inspection activities and corrective action process identified and corrected these degraded conditions prior to a loss of fire protection system intended functions.

Conclusion

The enhanced Fire Water System aging management program provides reasonable assurance that the aging effects are adequately managed so that the intended functions of fire water system components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.21 ABOVEGROUND OUTDOOR TANKS

Program Description

The Aboveground Outdoor Tanks aging management program will provide for management of loss of material aging effects for outdoor carbon steel and aluminum storage tanks. The program credits the application of paint as a corrosion preventive measure and performs periodic visual inspections to monitor degradation of the paint and any resulting metal degradation for the carbon steel tanks. The program will include periodic visual inspections of the aboveground aluminum tank. Periodic internal UT inspections will be performed on the bottom of outdoor carbon steel tanks and the outdoor aluminum storage tank supported by earthen/concrete foundations. The carbon steel tanks not directly supported by earthen or concrete foundations undergo external visual inspections without the necessity of bottom surface UT inspections.

The tanks supported by earthen/concrete foundations having sealants/coatings at the tank-foundation interfaces will be periodically inspected for degradation. For raised tanks not directly supported by earthen or concrete foundations, inspection of the sealant or caulking at the tank-foundation interface does not apply.

The program will require removal of insulation to permit visual inspection of insulated tank surfaces. Removal of insulation will be on a sampling basis.

The Aboveground Outdoor Tanks aging management program is a new program. The program will be implemented prior to the period of extended operation. Tanks will be inspected at an initial frequency of every five years.

NUREG-1801 Consistency

Program activities are consistent with the ten elements of aging management program XI.M29, "Aboveground Carbon Steel Tanks," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG-1801 does not include aluminum as a material type for the aboveground tanks. The Oyster Creek program includes inspection of the outdoor aluminum storage tanks.

Enhancements

None.

Operating Experience

The Aboveground Outdoor Tank Inspection Program is a new program being implemented at Oyster Creek, and therefore, no program experience exists. It will replace selective inspections and will complement those activities in place for

Tank Management of petroleum and other hazardous aboveground and buried tanks. The program is based on industry guidance and the NUREG-1801 program for Aboveground Carbon Steel Tanks.

The Condensate Storage Tank has been repaired to replace a corroded tank bottom. Periodic UT inspections will be performed on aluminum and carbon steel tank bottoms.

Conclusion

The new Aboveground Outdoor Tanks aging management program periodic inspections will provide reasonable assurance that the aging effects of loss of material are adequately managed so that the intended functions of outdoor aboveground carbon steel and aluminum storage tanks within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.22 FUEL OIL CHEMISTRY

Program Description

The Fuel Oil Chemistry aging management program activities are preventive activities that provide assurance that contaminants are maintained at acceptable levels in fuel oil for systems and components within the scope of Licensing Renewal. The fuel oil tanks within the scope of license renewal are maintained by monitoring and controlling fuel oil contaminants in accordance with the guidelines of the American Society for Testing and Materials (ASTM). Fuel oil sampling activities meet the intent of ASTM D 4057-95 (2000). Fuel oil will be routinely sampled and analyzed for particulate in accordance with modified ASTM Standard D 2276-00 Method A and for the presence of water and sediment in accordance with ASTM Standard D 2709-96. Fuel oil sampling and analysis is performed in accordance with approved procedures for new fuel and stored fuel. Fuel oil tanks are periodically drained of accumulated water and sediment and will be periodically drained, cleaned, and internally inspected. These activities effectively manage the effects of aging by providing reasonable assurance that potentially harmful contaminants are maintained at low concentrations.

NUREG-1801 Consistency

The Fuel Oil Chemistry aging management program is consistent with the ten elements of aging management program XI.M30, "Fuel Oil Chemistry," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

NUREG-1801 indicates that fuel oil tanks should be sampled for water and sediment, biological activity, and particulate on a periodic basis and that multilevel sampling of tanks should be performed. Multilevel sampling and tank bottom sampling of the Emergency Diesel Generator (EDG) Day Tanks are not routinely performed at Oyster Creek. The EDG Day Tanks do not have the capability of being sampled, however, these tanks are supplied directly from the EDG Fuel Storage Tank, which is routinely sampled and analyzed. The EDG Day Tanks are small in size and experience a high turnover rate of the fuel stored within as a result of routine engine operations. Stratification of fuel is not likely to occur in the EDG Day Tanks due to the high turnover rate. Additionally, the Emergency Diesel Generator Day Tanks are skid mounted on the Emergency Diesel Generator skid and are enclosed within the diesel enclosure, which is maintained at a constant temperature during cold periods through operation of the Emergency Diesel Generator keepwarm system. Maintaining a constant temperature during cold periods minimizes Emergency Diesel Generator Day Tank thermal cycling and reduces the potential for condensation formation within the Day Tanks. The routine draining of water and sediment from the bottom of the Day Tanks is therefore not necessary.

Oyster Creek has not committed to ASTM D 4057-95 (2000) for manual sampling standards:

- Sampling of the Emergency Diesel Generator Fuel Storage Tank, although not directly comparable to any of the tank sampling methods described in ASTM D 4057-95 (2000), ensures that a multilevel sample and a bottom sample are obtained. The EDG Fuel Storage Tank is equipped with a sample station that includes a sample recirculation pump and sample collection points located internal to the tank at several tank elevations, thus making the Emergency Diesel Generator Fuel Storage Tank sample station effective for obtaining multilevel samples. Tank bottom samples are obtained through a sample line located ½" off of the bottom of the tank sump.

- Fire Pond Diesel Fuel Tank samples are obtained from the tank fuel oil outlet line located 4" off of the bottom of the tanks. The Fire Pond Diesel Fuel Tanks are each 2.1 cu meter (550 gallons) capacity. Spot sampling requirements in ASTM D 4057-95 (2000) for tanks less than or equal to 159 cu meter include a single sample from the middle (a distance of one-half of the depth of liquid below the liquid's surface). Although the actual sample location is lower in the tank than prescribed by the ASTM, the lower elevation is more likely to contain contaminants and water and sediment which tend to settle in the tank, thus making this an effective spot sampling location. Bottom samples from the Fire Pond Diesel Fuel Tanks are taken off of the tank drain located on the bottom of the tank.

Oyster Creek does not add corrosion inhibitors to fuel oil. The analysis for particulate contaminants using modified ASTM D 2276-00 Method A is sufficient for the detection of corrosion products at an early stage. Fuel contaminants and degradation products will normally settle to the tank bottom where they would be detected by routine analysis or by periodic draining of water and sediment from the storage tank bottoms.

Enhancements

The Oyster Creek Fuel Oil Chemistry program will be enhanced to include the following:

- Routine analysis for particulate contamination using modified ASTM D 2276-00 Method A on fuel oil samples from the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank.

- Analysis for particulate contamination using modified ASTM D 2276-00 Method A on new fuel oil.

- Analysis for water and sediment using ASTM D 2709-96 for Fire Pond Diesel Fuel Tank bottom samples.

- Analysis for bacteria to verify the effectiveness of biocide addition in the Emergency Diesel Generator Fuel Storage Tank, the Fire Pond Diesel Fuel Tanks, and the Main Fuel Oil Tank.

- Periodic draining, cleaning, and inspection of the Fire Pond Diesel Fuel Tanks and the Main Fuel Oil Tank (already performed for the Emergency Diesel Generator Fuel Storage Tank). Inspection activities will include the use of ultrasonic techniques for determining tank bottom thicknesses should there be any evidence of corrosion or pitting.

Enhancements will be implemented prior to the period of extended operation.

Operating Experience

The Fuel Oil Chemistry aging management program has proven to be effective in identifying and correcting abnormal conditions in a timely manner. In 2003, Oyster Creek experienced high concentrations of water and sediment in Main Fuel Oil Tank samples. On previous occasions, high concentrations of water and sediment had also been detected in the Emergency Diesel Generator Fuel Storage Tank and Fire Pond Diesel Fuel Tanks. There were no fuel oil system failures attributed to a loss of material condition or biofouling as a result of these findings. Although fuel oil chemistry activities detected the high levels of contaminants in the fuel in a timely manner, and, corrective actions were initiated before blockage of fuel oil system supply lines or corrosion of fuel oil tanks and fuel supply lines occurred, fuel oil chemistry activities were enhanced to include the addition of biocides and stabilizers to fuel oil and to incorporate improved test methods for the early detection of water and sediment.

Conclusion

The enhanced Fuel Oil Chemistry aging management program provides reasonable assurance that the loss of material aging effects are adequately managed so that the intended functions of components exposed to fuel oil within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.23 REACTOR VESSEL SURVEILLANCE

Program Description

The Oyster Creek Reactor Vessel Surveillance program monitors the effects of neutron embrittlement on the reactor vessel beltline materials. The program is based the BWR Integrated Surveillance Program (ISP) and satisfies the requirements of 10 CFR 50, Appendix H. The Reactor Vessel Surveillance program is based upon BWRVIP-78 and BWRVIP-86-A. The NRC in its Safety Evaluation of April 27, 2004 approved use of the BWRVIP Integrated Surveillance Program at Oyster Creek (Amendment 242).

BWRVIP-116 identifies and schedules additional capsules to be withdrawn and tested during the license renewal period. Oyster Creek will continue to participate in using the Integrated Surveillance Program during the period of extended operation by implementing the requirements of BWRVIP-116, and by addressing any additional actions required by the associated NRC Safety Evaluation with BWRVIP-116, once it is issued.

The representative material and host plant for the limiting RPV plate and welds material and the associated schedule for withdrawal of these materials is identified in BWRVIP-116. Future withdrawal and testing of the remaining Oyster Creek surveillance capsule will be permanently deferred. As described in BWRVIP-116, BWR facilities that will not be required to remove additional surveillance capsules will determine vessel fluence utilizing an NRC-approved neutron fluence methodology during the extended license period. The program will ensure coupon availability during the period of extended operation by saving withdrawn coupons for future reconstitution. If BWRVIP-116 is not approved by the NRC, a plant-specific surveillance plan will be provided for the license renewal period in accordance with Appendices G and H to 10 CFR Part 50.

Oyster Creek has performed the RPV fluence analysis using an NRC-approved methodology to support license renewal. This analysis also satisfies the commitment associated with Amendment 242 for Oyster Creek to perform a neutron fluence evaluation using a method in accordance with RG 1.190.

NUREG-1801 Consistency

The Reactor Vessel Surveillance program is an existing Integrated Surveillance Program and is consistent with XI.M31, “Reactor Vessel Surveillance,” as specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

Oyster Creek will implement the requirements of BWRVIP-116 and address any additional actions required by the NRC Safety Evaluation for BWRVIP-116 once it is issued. If BWRVIP-116 is not approved by the NRC, a plant-specific surveillance plan will be provided for the license renewal period in accordance with Appendices G and H to 10 CFR Part 50.

Operating Experience

Oyster Creek has successfully implemented a plant-specific reactor surveillance program in accordance with 10CFR 50, Appendix H, ASTM Standard E-185, and RG 1.99, Revision 2. One of the original surveillance test capsules has been removed and tested.

Through participation in the BWRVIP ISP, the Oyster Creek Reactor Vessel Surveillance program will be adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

Conclusion

The implementation of the Reactor Vessel Surveillance program provides 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.1.24 ONE-TIME INSPECTION

Program Description

The Oyster Creek One-Time Inspection aging management program is a new program that will provide reasonable assurance that an aging effect is not occurring, or that the aging effect is occurring slowly enough to not affect the component or structure intended function during the period of extended operation, and therefore will not require additional aging management. The program will be credited for cases where either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, (b) an aging effect is expected to progress very slowly in the specified environment, but the local environment may be more adverse than that generally expected, or (c) the characteristics of the aging effect include a long incubation period. This program will be used for the following:

- To confirm crack initiation and growth due to stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), or thermal and mechanical loading is not occurring in Class 1 piping less than four-inch nominal pipe size (NPS) exposed to reactor coolant.
- To confirm the effectiveness of the Water Chemistry program to manage the loss of material and crack initiation and growth aging effects.
- To confirm the effectiveness of the Closed Cycle Cooling Water System program to manage the loss of material aging effect.
- To confirm the effectiveness of the Fuel Oil Chemistry program and Lubricating Oil Monitoring Activities program to manage the loss of material aging effect.
- To confirm loss of material in stainless steel piping, piping components, and piping elements is insignificant in an intermittent condensation (internal) environment.
- To confirm loss of material in steel piping, piping components, and piping elements is insignificant in an indoor air (internal) environment.
- To confirm loss of material is insignificant for non-safety related (NSR) piping, piping components, and piping elements of vents and drains, floor and equipment drains, and other systems and components that could contain a fluid, and, are in scope for 10CFR54.4(a)(2) for spatial interaction. The scope of the program consists of only those systems not covered by other aging management activities.

The new program elements include (a) determination of the sample size based on an assessment of materials of fabrication, environment, plausible aging effects, and operating experience; (b) identification of the inspection locations in the system or component based on the aging effect; (c) determination of the examination technique, including acceptance criteria that would be effective in managing the aging effect for which the component is examined; and (d) evaluation of the need for follow-up examinations to monitor the progression of aging if age related degradation is found that could jeopardize an intended function before the end of the period of extended operation. When evidence of an aging effect is revealed by a one-time inspection, the engineering evaluation of the inspection results would identify appropriate corrective actions.

The inspection sample includes “worse case” one-time inspection of more susceptible materials in potentially more aggressive environments (e.g., low or stagnant flow areas) to manage the effects of aging. Examination methods will include visual examination, VT-1 or VT-3 as appropriate, or volumetric examinations. Acceptance criteria is based on ASME Section XI for components required to meet ASME requirements, and on the design code of record and industry guidelines for non-ASME components.

The One-Time Inspection aging management program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

Program activities are consistent with the elements of aging program XI.M32, “One-Time Inspection,” specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

There is no programmatic operating experience specifically applicable to the new One-Time Inspection program. However, plant and industry operating experience will be considered in the selection of the component sample set.

Conclusion

The new One-Time Inspection program will provide reasonable assurance that either an aging effect is not occurring, or the aging effect is occurring so slowly that the intended function of the component or structure consistent with the current licensing basis is not affected. In either case there would be no need to manage an aging related degradation for the period of extended operation.

B.1.25 SELECTIVE LEACHING OF MATERIALS

Program Description

The Selective Leaching of Materials aging management program will consist of one-time inspections to determine if loss of material due to selective leaching is occurring. The scope of the program includes susceptible components such as piping, pumps and valves within the scope of license renewal that are exposed to raw water, closed cooling water, treated water, auxiliary steam, condensation or soil. Susceptible component materials are gray cast iron, brass and bronze with greater than 15% zinc, and aluminum bronze with greater than 8% aluminum.

The one-time inspection program includes visual inspections consistent with ASME Section XI VT-1 requirements, hardness tests and other appropriate examination methods as may be required to confirm or rule out selective leaching, and to evaluate the remaining component wall thickness. Components of the susceptible materials are selected from the different potentially aggressive environments. The purpose of the program is to determine if loss of material due to selective leaching is occurring. If selective leaching is found, the program provides for evaluation as to the effect it will have on the ability of the affected components ability to perform their intended function for the period of extended operation, and the need to expand the sample of components to be tested.

The Selective Leaching of Materials aging management program is a new program. The program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

Program activities are consistent with the ten elements of aging management program XI.M33, "Selective Leaching of Materials," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Selective Leaching of Materials aging management program is new. Therefore, no programmatic operating experience is available.

Industry operating experience has identified graphitization of submerged pump components from long-term immersion in saltwater environments. Any degradation of components due to selective leaching at Oyster Creek may have been classified with different aging mechanisms and the component deficiency corrected by repair or replacement. This includes the cast iron Circulating Water and Service Water pump subcomponents that have been replaced with stainless steel. Sample inspections at Oyster Creek will include cast iron components in a saltwater environment.

Conclusion

The Selective Leaching of Materials aging management program inspections will provide reasonable assurance that loss of material aging effects due to selective leaching are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.26 BURIED PIPING INSPECTION

Program Description

The Buried Piping Inspection aging management program includes preventive measures to mitigate corrosion and periodic inspection of external surfaces for loss of material to manage the effects of corrosion on the pressure-retaining capacity of piping and components in a soil (external) environment. Preventive measures are in accordance with standard industry practices for maintaining external coatings and wrappings. External inspections of buried components will occur opportunistically when they are excavated during maintenance. Upon entering the period of extended operation, inspection of buried piping will be performed within ten years, unless an opportunistic inspection occurs within this ten-year period. The program will be enhanced as described below to provide reasonable assurance that buried piping and piping components will perform their intended function during the extended period of operation.

NUREG-1801 Consistency

The Buried Piping Inspection aging management program is consistent with the ten elements of aging management program XI.M.34, "Buried Piping and Tanks Inspection," specified in NUREG-1801 with the following exceptions:

Exceptions to NUREG-1801

- NUREG-1801, Section X1.M.34 Buried Piping and Tanks Inspection AMP only includes buried carbon steel piping, however Oyster Creek has other material in their buried piping program that will be managed as part of this AMP. NUREG-1801, Section X1.M.34 Buried Piping and Tanks Inspection AMP relies on preventive measures such as coatings and wrappings, however portions of this piping may not be coated or wrapped. Inspections of buried piping that is not wrapped will inspect for loss of material due to general pitting, crevice, and microbiologically influenced corrosion.

- Oyster Creek does not have any buried tanks in the scope of license renewal.

Enhancements

The Buried Piping Inspection aging management program will be enhanced to include:

- Fire protection components in the scope of the program.

- Inspection of buried piping within ten years of entering the period of extended operation, unless an opportunistic inspection occurs within this ten-year period.

- Piping located inside the vault in the scope of the program.

Operating Experience

The Buried Piping Inspection aging management program activities as enhanced will be effective in managing aging degradation for the period of extended operation by providing timely detection of aging effects and implementation of appropriate corrective actions prior to loss of system or component intended functions. Oyster Creek has performed numerous external inspections of buried pipe during excavation activities. Repair of degraded coatings has been performed when necessary. In 1992 the Service Water system developed a leak that resulted from failure of the external coating. The root cause evaluation determined that failure was due to improper original coating application. Subsequently, Oyster Creek initiated the Oyster Creek Underground Piping Program. To date, there have been no other buried pipe leaks due to external degradation. Although failure of buried piping has occurred, it has been determined that the integrity of the buried piping leaks were caused from the inside of the buried piping which is evaluated with the Open Cycle Closed Cooling Water aging management program. Oyster Creek conducts pressure tests of safety-related buried piping to identify leaks and ensure adequate pressure integrity. This pressure testing is performed via pump surveillances.

Based on plant operating experience, coatings and wrappings have provided adequate protection to the external surfaces of buried piping such that loss of material due to external corrosion has not been a concern. There are some portions of buried stainless steel and bronze piping that may not be coated or wrapped. Oyster Creek has had no identified failures of this piping due to external degradation. Therefore, based on Oyster Creek and industry operating experience stainless steel and copper alloy material are resistant to corrosion in a buried environment. Additionally, Oyster Creek has cast iron fire hydrants that are not coated or wrapped. Again, Oyster Creek has had no failures of any of the buried hydrants due to external degradation. Furthermore, one of the hydrants was replaced in 2003 due to failure of the hydrant to drain and the external condition of the hydrant was in good condition. Thus inspection of buried piping when excavated for maintenance provides reasonable assurance that the intended functions will be maintained. Inspections will be performed upon ten years after entering the period of extended operation, unless an opportunistic inspection occurs within this ten-year period.

Conclusion

The enhanced Buried Piping Inspection aging management program will provide reasonable assurance that the aging effects on the external surfaces of buried piping and piping components are adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.27 ASME SECTION XI, SUBSECTION IWE

Program Description

The ASME Section XI, Subsection IWE aging management program provides for inspection of primary containment components and the containment vacuum breakers system piping and components. It is implemented through station plans and procedures and covers steel containment shells and their integral attachments; containment hatches and airlocks, seals and gaskets, containment vacuum breakers system piping and components, and pressure retaining bolting. The program includes visual examination and limited surface or volumetric examination, when augmented examination is required, to detect loss of material. The program also provides for managing loss of sealing for seals and gaskets, and loss of preload for pressure retaining bolting. Procurement controls and installation practices, defined in plant procedures, ensure that only approved lubricants and tension or torque are applied. The Oyster Creek program complies with Subsection IWE for steel containments (Class MC) of ASME Section XI, 1992 Edition including 1992 Addenda in accordance with the provisions of 10 CFR 50.55a.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWE aging management program is consistent with the ten elements of aging management program XI.S1, "ASME Section XI, Subsection IWE," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG-1801 evaluation is based on ASME Section XI, 2001 Edition including 2002 and 2003 Addenda. The current Oyster Creek ASME Section XI, Subsection IWE program plan for the First Ten-Year inspection interval effective from September 9, 1998 through September 9, 2008, approved per 10CFR50.55a, is based on ASME Section XI, 1992 Edition including 1992 addenda. The next 120-month inspection interval for Oyster Creek will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a 12 months before the start of the inspection interval.

Enhancements

None.

Operating Experience

ASME Section XI, Subsection IWE as described in Oyster Creek First-10 Year Containment (IWE) Inservice Inspection Program Plan and Basis is effective September 9, 1998 to September 9, 2008. Base line inspection of containment surfaces was completed in 2000 and a second inspection was completed in 2004. The 2004 inspection identified (2) recordable conditions, a loose locknut was identified on a spare drywell penetration and a weld rod was found stuck to the underside of the drywell head. Engineering evaluation concluded the stuck weld rod has no adverse impact on drywell head structural integrity and the loose locknut did not affect the seal of the containment penetration.

The upper region of drywell shell has experienced loss of material, due to corrosion, as result of water leakage into the gap between the containment and the reactor building in the 1980's. As a result the area is subject to augmented examinations as required by ASME Section XI, Subsection IWE. The examination is by ultrasonic (UT) thickness measurements. UT measurements taken in 2004 showed that the drywell shell thickness meets ASME criteria and that the rate of corrosion is in a declining trend. Engineering evaluation of the UT results also concluded that the containment drywell, considering the current corrosion rate, is capable of performing its intended function through the period of extended operation. Further discussion is provided in Section 4.7.2, "Drywell Corrosion" TLAA evaluation.

Similarly the sand bed region also experienced loss of material due to corrosion. Corrosion was attributed to the presence of oxygenated wet sand and exacerbated by the presence of chloride and sulfate in the sand bed region. As a corrective measure, the sand was removed and a protective coating was applied to the shell to mitigate further corrosion. Subsequent inspections confirmed that corrosion of the shell has been arrested. The coating is monitored periodically under the Protective Coating Monitoring and Maintenance Program, B.1.33. Refer to program B.1.33 for additional details.

The suppression chamber (Torus) and vent system were originally coated with Carboline Carbo-Zinc 11 paint. The coating is inspected every outage and repaired, as required, to protect the torus shell and the vent system from corrosion. Refer to program B.1.33 for additional details.

Operating experience review concluded that ASME Section XI, Subsection IWE is effective for managing aging effects of primary containment surfaces.

Conclusion

The ASME Section XI, Subsection IWE aging management program ensures that loss of material, loss of sealing, and loss of preload of primary containment components and the containment vacuum breakers system piping and components are adequately managed so that there is a reasonable assurance their intended function will be maintained consistent with the current licensing basis during the period of extended operation.

B.1.28 ASME SECTION XI, SUBSECTION IWF

Program Description

The ASME Section XI, Subsection IWF aging management program consists of periodic visual examination of ASME Section XI Class 1, 2, 3 and MC components and piping support members for loss of mechanical function and loss of material. Bolting is also included with these components, inspecting for loss of material and for loss of preload by inspecting for missing, detached, or loosened bolts. Procurement controls and installation practices, defined in plant procedures, ensure that only approved lubricants and torque are applied. The program is implemented through corporate and station procedures, which provide inspection and acceptance criteria consistent with the requirements of ASME Section XI, 1995 Edition with 1996 Addenda.

NUREG-1801 Consistency

The Oyster Creek ASME Section XI, Subsection IWF aging management program is consistent with the ten elements of aging management program XI.S3, "ASME Section XI, Subsection IWF," specified in NUREG-1801 with the following exception:

Exceptions to NUREG-1801

NUREG-1801 evaluation is based on ASME Section XI, 2001 edition including the 2002 and 2003 Addenda. The Oyster Creek program is based on 1995 Edition with 1996 Addenda. NUREG-1801 specifies the 2001 ASME Section XI B&PV Code, 2002 and 2003 Addenda for Subsection IWF. The current Oyster Creek ISI Program Plan for the fourth ten-year inspection interval effective from October 15, 2002 through October 14, 2012, approved per 10CFR50.55a, is based on the 1995 ASME Section XI B&PV Code, 1996 addenda. The next 120-month inspection interval for Oyster Creek will incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a 12 months before the start of the inspection interval.

Enhancements

- Enhance scope of the program to include additional MC supports.
- Add the requirement to inspect underwater supports for loss of material due to corrosion and loss of mechanical function.

Enhancements will be implemented prior to entering the period of extended operation.

Operating Experience

The operating experience of the Inservice Inspection (ISI) programs at Oyster Creek, which include ASME Section XI, Subsection IWF aging management program activities, has not shown any adverse trend of program performance.

Periodic self-assessments of the ISI programs have been performed to identify the areas that need improvement to maintain program quality.

There is sufficient confidence that the Component Support ISI Program Plan as described in the Oyster Creek ISI Program will effectively monitor the condition of the component supports within the License Renewal boundary, so that their design function will be maintained during the extended license period is ensured. Submittal of the Owner's Data Reports for Inservice Inspections covering the Oyster Creek Refueling Outage 20 (1R20) examinations was conducted between October 28, 2002 and November 22, 2004. The report includes the first period, of the Fourth Inservice Inspection (ISI) interval examinations performed in accordance with the ASME Code. There were challenges identified during this inspection. Scope expansion was required due to unacceptable as-found conditions on rod hangers. The identified conditions were evaluated or repaired, as required, and determined acceptable for return to service.

Conclusion

The aging management program provides reasonable assurance that the loss of material, loss of preload, and loss of mechanical function aging effect is adequately managed so that the intended functions of ASME Class 1, 2, 3, piping and component supports and Class MC component supports are maintained consistent with the current licensing basis during the period of extended operation.

B.1.29 10 CFR PART 50, APPENDIX J

Program Description

The 10 CFR Part 50, Appendix J aging management program provides for detection of age related pressure boundary degradation and loss of leak tightness due to aging effects such as loss of material, cracking, or loss of preload in the primary containment and various systems penetrating primary containment. The program also detects age related degradation in material properties of gaskets, o-rings, and packing materials for the primary containment pressure boundary access points.

The program consists of tests performed in accordance with the regulations and guidance provided in 10 CFR 50 Appendix J, “Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors,” Option B, Regulatory Guide 1.163, “Performance-Based Containment Leak-Testing Program,” NEI 94-01, “Industry Guideline for Implementing Performance-Based Options of 10 CFR Part 50, Appendix J,” ANSI/ANS 56.8, “Containment System Leakage Testing Requirements,” and station procedures. Containment leak rate tests are performed to assure that leakage through the primary containment and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the Technical Specifications. An integrated leak rate test (ILRT) is performed during a period of reactor shutdown at the frequency specified in 10 CFR Part 50, Appendix J, Option B. Local leak rate tests (LLRT) are performed on isolation valves and containment access penetrations at frequencies that comply with the requirements of 10 CFR 50 Appendix J, Option B.

NUREG-1801 Consistency

The 10 CFR Part 50, Appendix J aging management program is consistent with the ten elements of aging management program XI.S4, "10 CFR Part 50, Appendix J," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The industry has found that the 10 CFR Part 50, Appendix J testing program has been effective in maintaining the pressure integrity of the containment boundaries, including identification of leakage within the various systems’ pressure boundaries.

The Oyster Creek facility has demonstrated experience in effectively maintaining the integrity of the containment boundaries as evidenced by the selection of Option B of 10 CFR 50 Appendix J leakage testing requirements. The station has experienced "as found" LLRT results in excess of individual containment penetration administrative limits. Evaluations were performed and corrective actions were taken to restore the individual penetration leakage rates to within the established administrative leakage limits in accordance with the Appendix J testing program. Some site-specific examples are provided below.

In 2000, a local leak rate test of V-26-8 determined that the leakage rate was above the alert limit for that valve. The rate was evaluated to be acceptable as-found. The valve was subsequently rebuilt and retested satisfactorily the next refueling outage.

In 2002, a local leak rate test of V-19-20 determined that the leakage rate exceeded the action limit. The valve was repaired and the post-maintenance test LLRT was acceptable.

In 2004, a local leak rate test of MSIV NS04A determined that the leakage rate failed to meet acceptance criteria. The main seating surface was lapped and a successful LLRT was performed. As a result of this occurrence, the MSIV overhaul procedure was revised to include a documented management review prior to eliminating seat lapping after poppet replacement even if a successful blue check has been obtained.

Conclusion

The 10 CFR Part 50, Appendix J aging management program provides reasonable assurance that the loss of material and changes in material properties aging effects are adequately managed so that primary containment components within the scope of license renewal will continue to perform their intended functions consistent with the current licensing basis during the period of extended operation.

B.1.30 MASONRY WALL PROGRAM

Program Description

The Oyster Creek Masonry Wall Program is part of the Structures Monitoring Program. It is based on the guidance provided in I.E. Bulletin 80-11, “Masonry Wall Design," and Information Notice 87-67, “Lessons Learned from Regional Inspections of Licensee Actions in Response to I.E. Bulletin 80-11," and is implemented through station procedures. The scope of program includes all masonry walls that perform an intended function in accordance with 10 CFR 54.4. The program requires inspection of masonry walls for cracking on a frequency of 4 years, so that the established evaluation basis for each masonry wall remains valid during the period of extended operation.

NUREG-1801 Consistency

The Masonry Wall Program is consistent with the ten elements of aging management program XI.S5, "Masonry Wall Program," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Masonry Wall Program has provided for detection of cracks, and other minor aging effects in masonry walls. Maintenance history revealed minor degradation of masonry block walls; but none that could impact their intended function. In response to I.E. Bulletin 80-11, “Masonry Wall Design," and Information Notice 87-67, “Lessons Learned from Regional Inspections of Licensee Actions in Response to I.E. Bulletin 80-11," various actions were taken. Actions included program enhancements, follow-up inspections to substantiate masonry wall analyses and classifications, and the development of procedures for tracking and recording changes to the walls. These actions addressed all concerns raised by I.E. Bulletin 80-11 and Information Notice 87-67, namely unanalyzed conditions, improper assumptions, improper classification, and lack of procedural controls. Operating experience review concluded that the program is effective for managing aging effects of masonry walls.

Conclusion

The Oyster Creek Masonry Wall Program is part of the Structures Monitoring Program. The program provides for monitoring of masonry walls for cracking. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The program provides reasonable assurance that cracking of masonry walls is adequately managed so that their intended functions are maintained consistent with the current licensing basis during the period of extended operation.

B.1.31 STRUCTURES MONITORING PROGRAM

Program Description

The Structures Monitoring Program provides for aging management of structures and structural components, including structural bolting, within the scope of license renewal. The program was developed based on guidance in Regulatory Guide 1.160 Revision 2, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and NUMARC 93-01 Revision 2, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," to satisfy the requirement of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,"

The scope of the program also includes condition monitoring of masonry walls and water-control structures as described in the Masonry Wall Program and in the RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants, aging management program. As a result, the program elements incorporate the requirements of NRC IEB 80-11, "Masonry Wall Design", the guidance in NRC IN 87-67, "Lessons learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11", and the requirements of NRC Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants."

The program relies on periodic visual inspections by qualified personnel to monitor structures and components for applicable aging effects. Specifically, concrete structures are inspected for loss of material, cracking, and a change in material properties. Steel components are inspected for loss of material due to corrosion. Masonry walls are inspected for cracking, and elastomers will be monitored for a change in material properties. Earthen structures associated with water-control structures and the Fire Pond Dam will be inspected for loss of material and loss of form. Component supports will be inspected for loss of material, reduction or loss of isolation function, and reduction in anchor capacity due to local concrete degradation. Exposed surfaces of bolting are monitored for loss of material, due to corrosion, loose nuts, missing bolts, or other indications of loss of preload. The program relies on procurement controls and installation practices, defined in plant procedures, to ensure that only approved lubricants and proper torque are applied consistent with the NUREG-1801 bolting integrity program.

The scope of the program will be enhanced to include structures that are not monitored under the current term but require monitoring during the period of extended operation. Details of the enhancements are discussed below.

Inspection frequency is every four (4) years; except for submerged portions of water- control structures, which will be inspected when the structures are dewatered, or on a frequency not to exceed 10 years. The program contains provisions for more frequent inspections to ensure that observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process

NUREG-1801 Consistency

The Structures Monitoring Program is consistent with the ten elements of aging management program XI.S6,"Structures Monitoring Program," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

- The scope of the program will be increased to add buildings, structural components and commodities that are not in scope of maintenance rule but have been determined to be in the scope of license renewal. These include miscellaneous platforms, flood and secondary containment doors, penetration seals, liner for sumps, structural seals, and anchors and embedment.

- The scope of the program will be increased to include component supports, other than those in scope of ASME XI, Subsection IWF.

- The scope of the program will be enhanced to include inspection of external surfaces of mechanical components that are not covered by other programs, HVAC duct, damper housings, and HVAC closure bolting. Inspection and acceptance criteria of the exterior surfaces will be the same as those specified for structural steel components and structural bolting.

- The program will be enhanced to require removal of piping and component insulation to permit visual inspection of insulated surfaces. Removal of insulation will be on a sampling basis that bounds insulation material type, susceptibility of insulated piping or component material to potential degradations that could result from being in contact with insulation, and system operating temperature.

- The program will provide for inspections of, electrical panels and racks, junction boxes, instrument racks and panels, cable trays, offsite power structural components and their foundations, and anchorage.

- The program will provide for periodic sampling and testing of ground water and review its chemistry data to confirm that the environment remains non-aggressive for buried reinforced concrete.

- The program will provide for periodic inspection of components submerged in salt water (Intake Structure and Canal, Dilution structure) and in the water of the fire pond dam, including trash racks at the Intake Structure and Canal.

- The program will require inspection of penetration seals, structural seals, and other elastomers for change in material properties by inspecting the elastomers for cracking and hardening.

- The program will require inspection of vibration isolators, associated with component supports other than those covered by ASME XI, Subsection IWF, for reduction or loss of isolation function by inspecting the isolators for cracking and hardening.

- The current inspection criteria will be enhanced to add loss of material, due to corrosion for steel components, and change in material properties, due to leaching of calcium hydroxide and aggressive chemical attack for reinforced concrete. Wooden piles and sheeting will be inspected for loss of material and a change in material properties.
- The program will be enhanced to include periodic inspection of the Fire Pond Dam for loss of material and loss of form.

Enhancements will be implemented prior to the period of extended operation.

Operating Experience

The review of program documentation, and other plant operating experience before the program was implemented, identified cracking of reinforced of exterior walls of the reactor building, drywell shield wall above elevation 95', and the spent fuel pool support beam. Cracking of the reactor building exterior walls was generally minor and attributed to early shrinkage of concrete and temperature changes. Engineering evaluation concluded that the structural integrity of the walls is unaffected by the cracks. Repairs to areas of concern were made to prevent water intrusion and corrosion of concrete rebar. The cracks and repaired areas are monitored under the program to detect any changes that would require further evaluation and corrective action.

Cracking of the drywell shield wall was attributed to high temperature in the upper elevation of the containment drywell. Engineering analysis concluded that stresses are well below allowable limits taking into consideration the existing cracked condition. The shield wall cracking was addressed in NRC SEP review of the plant under Topic III-7B. The cracks have been mapped and inspected periodically under the program. Recent inspections identified no significant change in the cracked area.

Cracking of the spent fuel storage pool concrete support beams was identified in mid-1980. Subsequently crack monitors were installed to monitor crack growth and an engineering evaluation was performed. Based on the evaluation results and additional non-destructive testing to determine the depth of the cracks, it was concluded that the beams would perform their intended function, and that continued monitoring with crack monitors is not required. The cracks are examined periodically under the program and have shown little change.

Inspection of the intake canal, performed in 2001, identified cracks and fissures, voids, holes, and localized washout of coatings that protect embankment slopes from erosion. The degradations were evaluated and determined not to impact the intended function of the intake canal (UHS). However the inspector recommended repair of the degradations to prevent further deterioration. A project to repair the canal banks has been initiated.

Inspections conducted in 2002, concluded that degradations discussed above have not become worse and remains essentially the same as identified in previous inspections. In addition minor cracking, rust stains, water stains, localized exposed rebars and rebar corrosion, and damage to siding were observed. The degradations were evaluated and determined not to have an impact on the structural integrity of affected structures. Operating experience review concluded that the program is effective for managing aging effects of structures, structural components, and water-control structures.

Conclusion

The Structures Monitoring Program was developed to implement the requirements of 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.” The program relies on periodic visual inspections to monitor the condition of structures and structural components. Inspection frequency is every four (4) years (except for water-control structures) with provisions for more frequent inspections to ensure that observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. Submerged portions of water-control structures will be inspected when dewatered or on a frequency not to exceed ten (10) years.

The scope of the program will be enhanced to include all structures, and component supports not covered by other programs, the Fire Pond Dam, and exterior surfaces of mechanical components in the scope of license renewal that are not covered by other programs. Inspection criteria will also be enhanced to provide reasonable assurance that the aging effects are adequately managed so that the intended functions of structures and components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.32 RG 1.127, INSPECTION OF WATER-CONTROL STRUCTURES ASSOCIATED WITH NUCLEAR POWER PLANTS

Program Description

The RG 1.127 Revision 1, “Inspection of Water-Control Structures Associated with Nuclear Power Plants,” aging management program is part of the Structures Monitoring Program. It is based on the guidance provided in RG 1.127 and ACI 349.3R and will provide for periodic inspection of the Intake Structure and Canal (UHS), the Fire Pond Dam, and the Dilution structure. The program will be used to manage loss of material, cracking, and change in material properties for concrete components, loss of material and change in material properties for wooden components, and loss of material, and loss of form for the dam, and the canal slopes. Inspection frequency is every four (4) years; except for submerged portions of the structures, which will be inspected when the structures are dewatered, or on a frequency not to exceed 10 years. The program will be enhanced, as noted below, to provide reasonable assurance that water-control structures aging effects are adequately managed during the period of extended operation.

NUREG-1801 Consistency

The Oyster Creek RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is consistent with the ten elements of aging management program XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

- The program will provide for monitoring of submerged structural components and trash racks.
- Parameters monitored will be enhanced to include change in material properties, due to leaching of calcium hydroxide, and aggressive chemical attack.
- Add the requirement to inspect steel components for loss of material, due to corrosion
- Add the requirement to inspect wooden piles and sheeting for loss of material and change in material properties.
- The program will provide for periodic inspection of components submerged in salt water (Intake Structure and Canal, Dilution structure) and in the water of the fire pond dam.

- The program will be enhanced to include periodic inspection of the Fire Pond Dam for loss of material and loss of form.

Enhancements will be implemented prior to the period of extended operation.

Operating Experience

Operating history of the Intake structure and Canal, and the Dilution structure indicates that the structures are not experiencing significant degradation. Localized cracking and spalling of the Intake structure concrete was identified and repaired in mid 1980's. Recent inspection (2002) of the Intake structure and the Dilution structure noted some concrete spalling and cracking. However these aging effects were determined insignificant and have no adverse impact on the intended functions of the structures.

Inspection of the intake canal, performed in 2001, identified some cracks and fissures, voids, holes, and localized washout of coatings that protect embankment slopes from erosion. The degradations were evaluated and determined not to impact the intended function of the intake canal (UHS). The degradations are inspected periodically and evaluated to ensure that the intended function of the intake canal is not adversely impacted. Operating experience review concluded that the program is effective for managing aging effects of water-control structures.

Conclusion

The Oyster Creek RG 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," is part of the Structures Monitoring Program. The program requires periodic inspection of water-control structures for loss of material, cracking, changes in material properties, and loss of form. Observed conditions that have the potential for impacting an intended function are evaluated or corrected in accordance with the corrective action process. The scope of the program and inspection criteria will be enhanced to provide reasonable assurance that the aging effects are adequately managed so that the intended functions of water-control structures and components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.1.33 PROTECTIVE COATING MONITORING AND MAINTENANCE PROGRAM

Program Description

The Protective Coating Monitoring and Maintenance Program provides for aging management of Service Level I coatings inside the primary containment and Service Level II coatings for the external drywell shell in the area of the sandbed region. Service Level I coatings are used in areas where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair safe shutdown. Oyster Creek was not originally committed to Regulatory Guide 1.54 for Service Level I coatings because the plant was licensed prior to the issuance of this Regulatory Guide in 1974. Currently, Oyster Creek is committed to a modified version of this Regulatory Guide, as described in the response to GL 98-04, and, as detailed in the Exelon Quality Assurance Topical Report (QATR) NO-AA-10. Service Level II coatings provide corrosion protection and decontaminability in those areas outside of the primary containment that are subject to radiation exposure and radionuclide contamination. The Protective Coating Monitoring and Maintenance Program provides for visual inspections, assessment, and repairs for any condition that adversely affects the ability of Service Level I coatings, or sandbed region Service Level II coatings, to function as intended.

NUREG-1801 Consistency

The Protective Coating Monitoring and Maintenance Program is consistent with the ten elements of aging management program XI.S8, “Protective Coating Monitoring and Maintenance Program,” specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

Oyster Creek has successfully identified indications of age-related degradation in Service Level I coatings prior to the loss of intended functions and has taken appropriate corrective actions through evaluation or repair in accordance with the Service Level I coatings procedures and specifications. Torus and vent header vapor space Service Level I coating inspections performed in 2002 found the coating in these areas to be in good condition. Inspection of the immersed coating in the Torus identified blistering. The blistering occurred primarily in the shell invert but was also noted on the upper shell near the water line. The majority of the blisters remained intact and continued to protect the base metal. However, several blistered areas included pitting damage where the blisters were fractured. A qualitative assessment of the identified pits was performed and concluded that the measured pit depths were significantly less than the established acceptance criteria. The fractured blisters were repaired to reestablish the protective coating barrier.

The Service Level II coating effort completed in 14R has been effective in mitigating corrosion in the sand bed area. Since this was accomplished while the vessel thickness was sufficient to satisfy ASME code requirements, drywell vessel corrosion in the sand bed region is no longer a limiting factor in plant operation; however, inspections are conducted to ensure that the coating remains effective. To date, no age related degradation has been detected in the sandbed region Service Level II coating.

In 2003, it was identified that the replacement motor for the “A” recirculation motor was top coated with a non-DBA qualified coating on the motor housing, end bells, and stator. Engineering analysis concluded that the additional suction strainer debris loading that would be created by the failure of this additional unqualified coating was negligible.

Conclusion

The Protective Coating Monitoring and Maintenance Program provides reasonable assurance that aging effects are adequately managed so that the intended functions of Service Level I coatings inside primary containment, and Service Level II coatings outside of the primary containment in the sandbed region, are maintained consistent with the current licensing basis during the period of extended operation.

B.1.34 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Program Description

This new aging management program will be used to manage non-EQ cables and connections within the scope of license renewal that are subject to adverse localized environments. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for a subject cable or connection. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability.

Cables and connections subject to an adverse environment are managed by inspection of these components. A sample of accessible electrical cables and connections installed in adverse localized environments will be visually inspected for signs of accelerated age-related degradation such as embrittlement, discoloration, cracking, or surface contamination. Additional inspections, repair or replacement are initiated as appropriate.

Accessible cables and connections found to be located in adverse localized areas will be inspected prior to the period of extended operation, with an inspection frequency of at least once every 10 years. The scope of this program includes inspections of power, control and instrumentation cables and connections located in adverse localized areas.

NUREG-1801 Consistency

The aging management program for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is a new program. The program will be implemented prior to the period of extended operation. Program activities are consistent with the ten elements of aging program XI.E1, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

This program is new. Therefore, no programmatic operating experience is available. Instances of potentially age-related degradation of cables have been identified during the conduct of routine maintenance activities and dispositioned using the corrective action process. In each case, engineering evaluations determined the cause of the apparent degradation, the effect on operability and appropriate corrective action.

Oyster Creek also has a history of age-related cable failures involving inaccessible medium voltage cables in a wetted environment. Operating experience for these cables is addressed in the aging management program Inaccessible Medium Voltage Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements, B.1.36. As noted in NUREG-1801, industry operating experience has shown that adverse localized environments have been shown to exist and have been found to produce visibly observable degradation of insulating materials for electrical cables and connections.

Conclusion

The aging management program for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements provides reasonable assurance that aging effects will be adequately managed so that the intended functions of these types of cables and connections are maintained consistent with the current licensing basis during the period of extended operation.

B.1.35 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENT CIRCUITS

Program Description

The aging management program for Electrical Cables and Connections Not Subject to 10CFR 50.49 Environmental Qualification Requirements Used In Instrument Circuits within the scope of License Renewal provides aging management for cables and connections used in sensitive instrumentation circuits with low-level signals.

The cables of the Intermediate Range Monitoring (IRM), Local Power Range Monitoring/Average Power Range Monitoring (LPRM/APRM), Reactor Building High Radiation Monitoring, and Air Ejector Offgas Radiation Monitoring systems are sensitive instrumentation circuits with low-level signals and are located in areas where the cables and connections could be exposed to adverse localized environments caused by heat, radiation, or moisture. These adverse localized environments can result in reduced insulation resistance causing increases in leakage currents. This program considers the technical information and guidance provided in NUREG/CR-5643, Insights Gained From Aging Research, U.S. Nuclear Regulatory Commission, March 1992; IEEE Std. P1205-2000, IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations; SAND96-0344, Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations; and EPRI TR-109619, Guideline for the Management of Adverse Localized Equipment Environments, Electric Power Research Institute, Palo Alto, CA, June 1999.

For the IRM and LPRM/APRM systems, the program is implemented by station procedures that are currently used to perform Current/Voltage (I/V) and Time Domain Reflectometry (TDR) cable testing and have proven effective in determining cable insulation condition. Testing is performed every refueling outage. Corrective action, such as cable replacement, is taken if a cable fails to meet the acceptance criteria of the cable test procedure. As recommended by NUREG 1801 Section XI.E2, a review of the cable testing results for cable aging degradation will be performed before the period of extended operation and every 10 years thereafter.

For the Reactor Building High Radiation Monitoring, and Air Ejector Offgas Radiation Monitoring systems, the program is currently implemented by station procedures that are used to perform calibration testing required by the Technical Specifications. When an instrumentation channel is found to be out of tolerance or out of calibration, corrective action is taken such as recalibration and circuit trouble-shooting of the instrumentation cable system. As recommended by NUREG 1801 Section XI.E2, a review of the calibration testing results for cable aging degradation will be performed before the period of extended operation and every 10 years thereafter.

NUREG-1801 Consistency

The Electrical Cables and Connections Not Subject to 10CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits aging management program is consistent with the ten elements of aging management program XI.E2, Electrical Cables Not Subject To 10CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits specified in NUREG-1801. The program enhancements will be implemented prior to the period of extended operation.

Exceptions to NUREG-1801

None.

Enhancements

NUREG 1801 Section X1.E2 requires a review of the calibration results for cable aging degradation once every 10 years. Calibration results are not currently reviewed for cable aging degradation. This program will be revised to include a review of the Reactor Building High Radiation Monitoring and Air Ejector Offgas Radiation Monitoring system calibration results for cable aging degradation before the period of extended operation and every 10 years thereafter.

NUREG 1801 Section X1.E2 requires a review of test results for cable aging degradation once every 10 years. Cable test results are not currently reviewed for cable aging degradation. This program will be revised to include a review of the LPRM/APRM and IRM system cable testing results for cable aging degradation before the period of extended operation and every 10 years thereafter.

Operating Experience

The cable testing and calibrations that are used for this program are performed currently, and have proven effective in identifying the existence of degradation in the performance of the system tested. Oyster Creek has experienced failures of monitoring system cables and connectors that were identified during the conduct of routine testing. For example, a step change in the Air Ejector Offgas Radiation Monitor readings was corrected by replacement of the cables for both channels. When equipment cannot be brought into calibration, or when cable system tests indicate unacceptable results, evaluations are performed in accordance with the Corrective Actions Program and appropriate actions taken.

Conclusion

This aging management program Electrical Cables and Connections Not Subject to 10CFR 50.49 Environmental Qualification Requirements Used in Instrument Circuits provides reasonable assurance that aging effects are adequately managed so that the intended functions of these types of cables and connections are maintained consistent with the current licensing basis during the period of extended operation.

B.1.36 INACCESSIBLE MEDIUM-VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Program Description

The Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages inaccessible medium-voltage cables that are exposed to significant moisture simultaneously with significant voltage.

Significant moisture is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time.

Oyster Creek has a total of 47 medium voltage cable installations. Because of Oyster Creek's history of medium voltage cable failures, all 47 cable circuits are conservatively assumed to have the potential to be exposed to significant moisture conditions. Further, all are conservatively assumed to be energized more than 25% of the time. Consequently, all 47 medium voltage cable circuits are included in the scope of the Inaccessible Medium Voltage Cables Not Subject To 10CFR 50.49 Environmental Qualification Requirements Program.

This program will inspect manholes, conduits and sumps associated with the 47 cable circuits for water collection so that draining or other corrective actions can be taken. Inspections for water collection will be performed at least once every 2 years and the frequency of testing will be adjusted based on the results obtained. The first inspections will be completed prior to the period of extended operation.

In addition, these medium-voltage cable circuits will be tested using a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, or other testing that is state-of-the-art at the time the test is performed. Cable testing will be performed at least once every 10 years and the frequency of testing will be adjusted depending on the results obtained. The first tests will be completed prior to the period of the extend operation.

NUREG-1801 Consistency

The aging management program for Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is a new program. The program is scheduled for implementation prior to the period of extended operation. Program activities are consistent with the ten elements of aging management program XI.E3, Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, specified in NUREG-1801.

Exceptions

None.

Enhancements

None.

Operating Experience

Oyster Creek has experienced eleven in-service medium voltage circuit failures to date. Five resulted from water intrusion, four from manufacturing defects and two from a single lightning strike. The majority of those failures occurred in EPR-insulated "UniShield" cables manufactured by Anaconda before 1985. In 1991, Oyster Creek implemented a medium voltage cable testing program covering all 47 of its medium voltage circuits to attempt to identify cable degradation so that appropriate corrective action could be taken prior to failure. The results of that inspection program have successfully identified degradation in XLPE-insulated cables prior to failure, but has not been able to do so for EPR-insulated cable.

Testing performed under the current cable testing program has successfully identified degradation in XLPE-insulated cables (e.g., GE Vulkene) such that replacements could be made prior to in-service failures. Eleven XLPE-insulated cable circuit replacements have been made based on test results since the testing program was implemented in 1991. No in service failures of XLPE-insulated cable have occurred since the testing program was implemented in 1991

Testing performed under the current cable testing program has not been successful at identifying degradation in EPR-insulated UniShield type cables, for example Anaconda UniShield, such that replacements could be made prior to in-service failures. Five in-service failures of UniShield cable circuits exposed to moisture have occurred since the testing program was implemented in 1991. Four of the five failed cables were manufactured before UniShield manufacturing process improvements to address manufacturing defects were implemented in mid-1984. Oyster Creek has experienced no failures in UniShield cables manufactured after that date.

Following the most recent in-service cable failure in 2003, corrective actions were completed to (1) test failed cables, to confirm the failure mechanisms, (2) confirm the accuracy of configuration information for 4160V circuits, (3) evaluate all remaining UniShield cables and replace or schedule for replacement any manufactured before 1985 which might be exposed to significant moisture and (4) eliminate the future use of UniShield cables at Oyster Creek.

Oyster Creek tested 18 of its medium voltage cable circuits in 2004 in a trial use of a new, state-of-the-art testing method based on partial discharge. As a result, one XLPE insulated cable was replaced. Additional medium voltage cables will be tested in 2005. Following evaluation, a decision will be made as to the effectiveness of this testing method and whether a commitment will be made for its long term use. The current inspection program will remain in effect until replaced the 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. Therefore, no programmatic operating experience is available.

Conclusion

The aging management program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 environmental qualification requirements provides reasonable assurance that aging effects are adequately managed so that the intended functions of these cables are maintained consistent with the current licensing basis during the period of extended operation.

B.2 PLANT SPECIFIC AGING MANAGEMENT PROGRAMS

B.2.1 PERIODIC TESTING OF CONTAINMENT SPRAY NOZZLES

Program Description

The periodic tests of drywell and torus spray nozzles address a NUREG-1801 Section V.D2 concern that flow orifices and spray nozzles in the drywell and torus spray subsystems are subject to plugging by rust from carbon steel piping components, and therefore a plant-specific aging management program is to be evaluated.

The Oyster Creek containment (drywell and torus) spray nozzles are stainless steel. There are no carbon steel flow orifices in the system piping, within the scope of license renewal. However, upstream carbon steel piping is subject to possible general corrosion. These periodic tests, performed every fifth refueling outage, use approved plant procedures to verify that the drywell and torus spray nozzles are free from plugging that could result from corrosion product buildup from upstream sources.

Aging Management Program Elements

(1) **Scope of Activity:** The tests include the containment (drywell and torus) spray nozzles. The tests provide verification that the spray nozzles are not blocked and are available to perform their intended function.

(2) **Preventive Actions:** The spray nozzle tests do not provide any preventative actions. The spray nozzle tests provide condition monitoring to detect the degradation prior to a loss of function.

(3) **Parameters Monitored/Inspected:** The flow tests demonstrate that the drywell and torus spray nozzles are not blocked by debris or corrosion products, and thereby demonstrate that the nozzles are available to provide the drywell and torus steam quenching functions. The nozzles are tested with compressed air. Test procedures require that flow be demonstrated through each individual nozzle.

(4) **Detection of Aging Effects:** The periodic drywell and torus spray nozzle flow tests detect plugging by corrosion products from the degradation of carbon steel piping and fittings.

5) **Monitoring and Trending:** The results of the spray nozzle tests are monitored but are not trended. If flow to a nozzle is blocked or restricted the degraded condition is evaluated and corrective actions are taken to restore normal flow.

(6) **Acceptance Criteria:** The test procedures contain acceptance criteria that require that flow be observed from each individual drywell and torus spray nozzle. The test uses a mechanical indicator (flow streamer or other device)

to detect the presence of air flow at each nozzle. The acceptance criteria provide assurance that flow to the drywell and torus spray headers and spray nozzles is not blocked or restricted.

(7) Corrective Actions: If a test shows that flow to a nozzle is blocked or restricted, an Issue Report is initiated to document the concern in accordance with plant administrative procedures. The degraded condition is evaluated and corrective actions are taken as necessary to restore normal flow. The 10 CFR Part 50, Appendix B corrective actions program ensures that conditions adverse to quality are promptly corrected. If the deficiency is found to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude recurrence.

(8) Confirmation Process: Site quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

(9) Administrative Controls: See Item 8, above.

(10) Operating Experience: In 2000, performance of the torus spray nozzle air test revealed 2 torus nozzles showing no flow of air. An evaluation determined that design basis accidents could be successfully mitigated with the nozzles plugged. Cause of the plugging was determined to be rust particles from the cyclic wetting and drying of the piping when the system had been flow tested monthly by a method no longer used. A revision to the system testing procedure to return torus test water through the drywell vent system precludes flushing water through the nozzle piping, and the nozzles are air tested. The nozzles were subsequently flushed clear and re-tested satisfactorily.

The Oyster Creek facility demonstrates a good operating experience in maintaining the operability of the drywell and torus spray headers and spray nozzles. The periodic air flow tests effectively manage the plugging aging effect so that the intended function of providing a quenching spray will be maintained during the period of extended operation.

Enhancements

None.

Conclusion

The periodic containment spray nozzle flow tests effectively manage drywell and torus spray header and spray nozzle plugging by corrosion products. The program provides reasonable assurance that intended functions are maintained consistent with the current licensing basis during the period of extended operation.

B.2.2 LUBRICATING OIL MONITORING ACTIVITIES

Program Description

The Lubricating Oil Monitoring Activities program manages loss of material, cracking, and fouling in lubricating oil coolers, systems and components in the scope of license renewal. These activities include measures to minimize corrosion and to mitigate loss of material and cracking in heat exchangers by monitoring lubricating oil properties. Sampling, testing, and trending verify lubricating oil properties and ensure that the intended functions of the coolers are not lost. Oil analysis permits identification of specific wear mechanisms, contamination, and oil degradation within operating machinery and components. The activities manage physical and chemical properties in lubricating oil. The complete aging management program for lubricating oil heat exchangers also includes secondary side (heat sink) chemistry controls and/or testing.

Aging Management Program Elements

(1) Scope of Activity:

The following lubricating oil coolers are subject to this program:

- Emergency Diesel Generator Lubricating Oil Coolers
- Fire Protection Pump Gear Box Lubricating Oil Coolers

The following systems and their components are also subject to this program: Emergency Diesel Generators, Main Turbine and Auxiliaries, Main Generator and Auxiliaries System, Reactor Recirculation System, Control Rod Drive System, Reactor Water Cleanup System, Fire Protection System, Feedwater System, Reactor Building Closed Cooling Water System, Service Water System, and Miscellaneous Floor and Equipment Drain System.

(2) Preventive Actions: Monitoring and control of oil impurities and properties mitigates loss of material, cracking, and fouling in lubricating oil systems.

(3) Parameters Monitored/Inspected: The program includes specifications for known oil degradation indicators and degradation characteristics, sampling and analysis frequencies, and corrective actions for control of lubricating oil properties. Lubricating oil physical properties are tested to standard ASTM and ISO methods, for the applicable oil type, to provide accurate quantitative numbers with repeatable results. Samples are taken, and surveillance testing and operational surveillances verify proper heat exchanger performance to support associated system operability. Oil is analyzed for indications of degraded chemical and physical properties depending on oil type and type of service. Surveillance testing verifies proper heat exchanger performance to support associated system operability.

Analyses include:

- Chemical parameters and viscosity, total acid number, total base number, rotating pressure vessel oxidation test, water demulsability, particle count, fuel and combustion byproducts, sediment, water, anti-foaming characteristics, whole particle counting, air release and emission spectrum. Normal, alert, and fault levels for oil chemical and physical properties, wear metals, contaminants, and additives are established for the specific oil type and application.

Monitoring for the presence of chloride ions is not performed. Based on past precedence (NUREG-1796, Dresden and Quad Cities SER, paragraph 3.0.3.16.2), the staff concluded that monitoring for chloride ions in lubrication oil is not required. EPRI 1003056, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 3, Appendices C and G address oil environments in general and lubricating oil environments for heat exchangers, respectively. Appendix C identifies damaging effects associated with chlorides in fuel oil environments, but no similar effects are identified for lubricating oil environments. Appendix G does not identify any applicable aging effects associated with chlorides for lubricating oil environments in heat exchanger components. Additionally, there is no Oyster Creek site operating experience of failure or degradation in oil environments attributed to the presence of chlorides.

(4) **Detection of Aging Effects:** Monitoring activities maintain lubricating oil properties within predefined limits to both mitigate and detect the effects of aging. Oil analysis has become an accurate method for identifying specific wear mechanisms, contamination, and oil degradation characteristics within operating machinery. The program includes normal, alert, and fault action levels for oil chemical and physical properties, wear metals, contaminants, and additives, for the specific oil type and application. Increased impurities and degradation of oil properties indicate degradation of materials in lubricating oil systems. Monitoring of the diagnostic parameters indicates degradation due to aging effects prior to loss of intended function. Monitoring frequencies have been established depending on the component and service, for example, the Emergency Diesel Generator (EDG) crankcase is monitored four times a year, while EDG lube oil is monitored twice a year, and turbine lube oil is monitored twice a year. Sampling frequency is increased if plant and equipment operating conditions indicate a need to do so.

(5) **Monitoring and Trending**: See Items 3 and 4, above for parameters and frequencies. The lubricating oil analysis results are evaluated for acceptability, and are trended and evaluated using computer software and a database.

(6) **Acceptance Criteria:** Normal, alert, and fault levels have been established for the various chemical and physical properties, wear metals, additives, and contaminant levels based on information from oil manufacturers, equipment manufacturers, and industry guidelines, for the specific oil type and application. The program maintains contaminant and parameter limits within the application-specific limits. The procedures outline potential actions to be taken at alert and fault levels, and actions can be chosen based on the level

of deviation. Aging effects or unacceptable results are evaluated and appropriate corrective actions are taken.

(7) Corrective Actions: Lubricating oil chemical and physical test results or contaminants outside the allowable limits are returned to the acceptable range within reasonable time periods as identified in industry guidelines. Evaluations are performed for test results that do not satisfy established criteria and an Issue Report is initiated to document the concern in accordance with plant administrative procedures. The corrective actions program ensures that conditions adverse to quality are promptly corrected. If the deficiency is found to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude recurrence.

(8) Confirmation Process: Site quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

(9) Administrative Controls: See Item 8, above.

(10) Operating Experience: The overall effectiveness of lubricating oil monitoring activities is indicated by the Oyster Creek operating experience. Lubricating oil sampling and analysis have detected particulate or water contamination (or both) in lubricating oil systems. In some cases these events resulted in systems being declared inoperable until repaired, and until the oil was flushed or replaced. Operating experience has produced procedure and program changes, which have improved the effectiveness of lubricating oil testing and inspection activities.

Following are some examples:

In 2001, a Core Spray Pump oil analysis detected a high ratio of large to small particles after an oil change. Further investigation determined there had been no increase in pump vibration levels for an extended period, and that source of the particles in the changed oil was contamination from the reservoir when the oil change occurred. The reservoir was flushed to remove particles and new oil was added. An increased oil surveillance frequency was established to confirm oil condition.

In 2002, a Control Rod Drive Pump oil analysis indicated high Wear Particle Concentration, which resulted in flushing of the bearing, adding new oil, and monitoring further for bearing wear. A follow-up oil sample was scheduled to provide more data for analysis, in addition to scheduled pump vibration analysis.

Enhancements

Surveillance procedures for the Diesel Driven Fire Protection System Pumps will be enhanced to verify flow through the gearbox lubricating oil cooler. (The Emergency Diesel Generator Lubricating Oil Coolers do not require similar procedural enhancement since temperature monitoring for these coolers exists.)

Conclusion

The lubricating oil preventive, inspection, and testing activities mitigate, detect, monitor, and trend the effects of loss of material and cracking in lubricating oil coolers. The program provides reasonable assurance that intended functions are maintained consistent with the current licensing basis during the period of extended operation.

B.2.3 GENERATOR STATOR WATER CHEMISTRY ACTIVITIES

Program Description

The generator stator water chemistry activities program is a plant specific non-NUREG-1801 aging management program (AMP). Oyster Creek chemistry activities manage "Loss of Material" aging effects in components exposed to stator cooling water. Stator cooling water chemistry activities provide for monitoring and controlling of water chemistry using an Oyster Creek procedure and process that are based on General Electric Company Document GEK 45942, Stator Winding Cooling Water System Operation and Flushing and EPRI TR-105504, Primer on Maintaining the Integrity of Water Cooled Generator Stator Windings, which provide guidelines for stator cooling water chemistry control.

Control of stator cooling water chemistry in accordance with General Electric and EPRI guidelines results in the water being maintained to a high degree of purity. In addition to maintaining the water in a highly pure state, areas of low flow do not exist where pitting corrosion could occur while the system is in operation. The system is in operation whenever the main generator is on line. Flow instruments cause automatic actions to reduce generator electrical output if low flow occurs. This condition would cause an investigation of the low flow condition and actions taken to restore normal flow.

Aging Management Program Elements

(1) **Scope of Program:** Stator cooling water is continuously monitored for purity by installed conductivity cells and periodically analyzed for impurities and dissolved oxygen. These conductivity cells will annunciate alarms in the event water purity decreases to a predetermined limit. Additionally, water chemistry parameters are maintained in accordance with General Electric and EPRI guideline for stator cooling water systems. Maintaining these parameters within specifications mitigates the aging effects caused by crevice and pitting corrosion.

Stress corrosion cracking (SCC) is not considered an aging mechanism that requires aging management. SCC of stator cooling water components is unlikely as contaminants are maintained at very low levels and the system is normally operated at temperatures less than 140 °F. The system is equipped with both filters and a resin bed that continuously filters a portion of the system flow.

(2) **Preventive Actions:** Loss of material due to crevice and pitting corrosion is mitigated by maintaining the stator cooling water chemistry parameters within specifications, and by maintaining adequate system flow. Although not required for crevice corrosion, high levels of impurities or high temperatures significantly increase the rate at which crevice corrosion occurs. Low flow and the presence of impurities are required for pitting corrosion to occur. Therefore, maintaining adequate flow and low levels of impurities mitigates

pitting corrosion. And maintaining low levels of impurities, along with low normal system operating temperatures, mitigates crevice corrosion.

Stress corrosion cracking of stator cooling water components is unlikely as contaminants are maintained at very low levels in accordance with General Electric and EPRI guidelines, and the system is normally operated at temperatures less than 140° F. As discussed in Element 1 above, SCC of stator cooling water system components is unlikely to occur due to high water purity and the low operating temperature of the system.

(3) **Parameters Monitored**: Water conductivity is continuously monitored to ensure purity. Additionally, site procedures require periodic (monthly) analysis of water chemistry samples for conductivity, dissolved oxygen, iron and copper. Chemistry parameters are monitored in accordance with the guidelines provided by General Electric and EPRI.

(4) **Detection of Aging Effects:** This program mitigates the loss of material aging effects. It is not credited for detection of aging effects.

(5) **Monitoring and Trending:** Water conductivity is continuously monitored and alarmed if pre-established limits are reached. Chemistry parameters are maintained in accordance with the guidelines provided by General Electric and EPRI.

(6) **Acceptance criteria:** Water chemistry parameters are maintained within the guidelines provided by General Electric and EPRI. See Element (2) above.

(7) **Corrective Actions:** Corrective actions are taken whenever water chemistry parameters are found outside the guidelines, in order to restore chemistry values to within acceptable limits. Evaluations are performed for test results that do not satisfy established criteria and an Issue Report is initiated to document the concern in accordance with plant administrative procedures. The 10 CFR Part 50, Appendix B corrective action program ensures that the conditions adverse to quality are promptly corrected. If the condition is assessed to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude recurrence.

(8) **Confirmation Process:** Stator cooling water is continuously analyzed in-line for conductivity, and water samples are periodically analyzed for impurities and dissolved oxygen. The in-line conductivity meters are cross-checked at a monthly frequency by a portable conductivity meter. When any chemistry parameter is found outside goal or limit values, actions are initiated to return the parameter to within the desired range. Additional sampling is performed to confirm that the parameter is back within the desired range. Site quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

(9) **Administrative Controls:** See attribute (8) above.

(10) **Operating Experience:** Oyster Creek has exhibited a good operating history with the stator cooling water system long-lived components. There has been

no age related degradation of stator cooling water system components within the scope of license renewal. The current water chemistry activities have been proven effective in managing aging of the stator cooling water system components.

Enhancements

None.

Conclusion

The Oyster Creek generator stator water chemistry activities AMP provides reasonable assurance that the intended functions of the Oyster Creek stator cooling water system components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

B.2.4 PERIODIC INSPECTION OF VENTILATION SYSTEMS

Program Description

The Periodic Inspection of Ventilation Systems aging management program includes periodic visual inspections of the Oyster Creek ventilation systems in the scope of license renewal. Periodic visual inspections are performed during system preventive maintenance activities on a frequency not exceeding five years. Components subject to visual inspections include buried ventilation ductwork, flexible connections, fan, filter and heater housings, damper housings, access door seals, valves, piping and fittings, cooling and heating coils, thermowells, flow elements and restricting orifices. The exterior surfaces of ventilation ducts and damper housings will be inspected by the Structures Monitoring Program, B.1.31.

The program inspects internal and external surfaces of ventilation system components to identify and assess aging effects that may be occurring. The program includes surface inspections for indications of loss of material, such as rust, corrosion and pitting. Heat transfer surfaces are inspected for fouling. Flexible connection and door seal elastomer materials are inspected for detrimental changes in material properties, as evidenced by cracking, perforations in the material or leakage and for loss of material due to wear. Existing maintenance activities will be enhanced to include duct exposed to soil, instrument piping and valves, restricting orifices and flow elements, and thermowells. The activities will also be enhanced to include inspection guidance for detection of the applicable aging effects. Enhancements will be incorporated prior to the period of extended operation.

The pressure boundary integrity of ventilation systems required for post-accident radiological containment or control room habitability is confirmed by periodic system surveillance tests.

Identified aging effects are evaluated by engineering to determine a) if loss of material or aging is occurring, and if so, b) the rate at which the material is being lost or degraded. Engineering evaluations of the inspection results also c) determine the need for follow-up examinations to monitor the progression of aging degradation, and d) identify appropriate corrective actions to mitigate any excessive rates of degradation discovered. Corrective actions, if necessary, include additional component examinations or tests.

Aging Management Program Elements

(1) Scope of Activity: Oyster Creek performs visual inspections of ventilation systems in the scope of license renewal. The scope of existing inspections includes flexible connections, fan and filter housings, and access door seals. The program will be enhanced to include duct exposed to soil, instrument piping and valves, restricting orifices and flow elements, and thermowells. Inspections of carbon steel fan and filter housings are considered representative of the internal surfaces of the carbon steel damper housings in the system. If aging degradation is identified on the fan or filter housing internal carbon steel surfaces, the condition will be evaluated to determine if the carbon steel damper housings will require inspection. The exterior surfaces of ventilation ducts and damper housings will be inspected by the Structures Monitoring Program.

(2) Preventive Actions: The ventilation system inspections do not provide any preventive actions. The inspections provide for condition monitoring to detect degradation prior to a loss of system intended function.

(3) Parameters Monitored/Inspected: Visual inspections of the ventilation system ductwork and components determine if penetrating corrosion indicating a loss of material aging degradation is occurring. Heat transfer surfaces are also inspected for fouling. Flexible connections are inspected to ensure they are free of cracking and damage. Door seals are inspected for cracking, damage or loss of material when the associated access door is opened, or are inspected for leakage when the door in closed and the system is in service. The flexible connections and door seals are evaluated if cracking, damage or leakage is identified.

Existing plant implementing documents will be enhanced to ensure that ventilation system components are properly inspected for age related degradation. For the Standby Gas Treatment, Reactor Building Ventilation and Control Room Ventilation Systems, the results of the inspections are verified by the performance of system leakage tests and filter efficiency tests.

These inspections and tests manage the aging effects that could impact system and component pressure boundary integrity, providing reasonable assurance that ventilation system intended functions will be maintained consistent with the current licensing basis, for the period of extended operation.

(4) Detection of Aging Effects: Ventilation system components are subject to the following aging effects:

- Loss of Material
- Change in Material Properties (Elastomer materials)
- Reduction of Heat Transfer

Aging effects are detected by periodic visual inspections and system tests. These inspections and tests are performed on a frequency not to exceed five years.

Visual inspections are performed by qualified and experienced maintenance personnel. The preventive maintenance procedures will be enhanced to provide the following specific guidance to inspect for aging effects:

- Loss of Material: Inspect for corrosion, rust, pitting or wear
- Change in Material Properties: Inspect for cracking, perforations or other damage

Visual inspections, with the above enhancements, will be included as part of the preventive maintenance activities that are performed on the various ventilation systems that are in the scope of license renewal at Oyster Creek. These preventive maintenance activities are focused on the ventilation system fans, filters, dampers, fan flexible connections and door seals. These activities will be enhanced to include inspection of Instrument piping and valves, restricting orifices and flow elements, thermowells, and Standby Gas Treatment System duct exposed to soil. Inspections are performed at a frequency not to exceed five years, to detect aging prior to loss of system function.

(5) Monitoring and Trending: The periodic visual examinations are used to provide assurance that penetrating corrosion of ventilation system duct and components are not occurring or are occurring at an acceptable rate. The condition of the elastomers used in ventilation systems are monitored and the results of the inspections are reviewed to assure intended functions are maintained. Flexible connections and access door seals are repaired or replaced if damage or deterioration is detected.

(6) Acceptance Criteria: Ventilation duct and components are checked for signs of loss of material. Elastomers are inspected for cracking, damage and loss of material. Elastomers are repaired or replaced if a degraded condition is found. Heat transfer surfaces are inspected for corrosion and fouling. Identified aging effects are evaluated by engineering to determine a) if penetrating corrosion indicating a loss of material aging is occurring, and if so, b) the rate at which the material is being lost. Engineering evaluations will also c) determine the need for follow-up examinations to monitor the progression of aging degradation, and d) identify appropriate corrective actions to mitigate any excessive rates of degradation discovered.

(7) Corrective Actions: Evaluations are performed for inspection results that identify penetrating corrosion or elastomer degradation, or test results that do not satisfy established criteria, and an Issue Report is initiated to document the concern in accordance with plant administrative procedures. The corrective actions program ensures that the conditions adverse to quality are promptly corrected. If the deficiency is assessed to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude recurrence.

(8) Confirmation Process: Site quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

(9) Administrative Controls: See Item 8 above.

(10) Operating Experience: Oyster Creek has experienced surface corrosion of outdoor equipment housings and duct and damage to elastomers and deterioration of flexible connections that resulted in leakage of ventilation systems. These conditions were identified and corrected prior to loss of function of the systems. Maintenance procedures were revised to include steps to inspect for corrosion of outdoor equipment housings. Periodic preventive maintenance inspections of ventilation system components, including specific guidance to identify applicable aging effects, will effectively monitor the condition of system components such that degradation will continue to be identified prior to loss of intended functions.

A buried section of Standby Gas Treatment system duct failed due to external corrosion of the aluminum duct exposed to a soil environment. The failure occurred after approximately thirty years in service. The failed section was repaired with a sleeve. Periodic inspections of the buried duct section will be performed.

Enhancements

Existing ventilation system periodic preventive maintenance activities will be enhanced as follows:

- Instrument piping and valves, restricting orifices and flow elements, thermowells, and Standby Gas Treatment System duct exposed to soil will be added to the scope of the plant implementing documents.

- Specific guidance for identification of applicable aging effects will be added to the preventive maintenance documents.

Conclusion

The proposed enhanced Oyster Creek Periodic Inspection of Ventilation Systems activities will assure that the ventilation system components are routinely inspected for deterioration and damage, and will adequately manage aging effects. The program provides reasonable assurance that intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

B.2.5 PERIODIC INSPECTION PROGRAM

Program Description

The Oyster Creek Periodic Inspection Program will address systems in the scope of license renewal that require periodic monitoring of aging effects, and are not covered by other existing periodic monitoring programs. Activities will consist of a periodic inspection of selected systems and components to verify integrity and confirm the absence of identified aging effects. The inspections will be condition monitoring examinations, intended to assure that existing environmental conditions are not causing material degradation that could result in a loss of system intended functions.

This program is used for the following:

- To confirm change in material properties due to aging is not occurring in elastomer expansion joints, flexible hoses and flexible connections, and in polymer tanks exposed to oil, treated water and raw water.
- To confirm reduction of heat transfer due to aging is not occurring in heat exchangers exposed to an outdoor environment.
- To confirm loss of material in components like piping, piping components, piping elements, heat exchangers, filters, ductwork and fan housings is insignificant in a variety of environments.

The program elements will include (a) determination of appropriate inspection sample size, (b) identification of inspection locations, (c) selection of examination technique, with acceptance criteria, and (d) evaluation of results to determine the need for additional inspections or other corrective actions.

The sample size will be based on aspects such as the specific aging effect, location, existing technical information, materials of construction, service environment, or previous failure history. The inspection samples will include locations where the most severe aging effect(s) would be expected to occur. The inspection locations will be based on aspects such as similarity of materials of construction, fabrication, operating environment, or aging effects. Inspection methods may include visual examination, VT-1 or VT-3, surface or volumetric examinations, or other established Non-Destructive Examination (NDE) techniques.

This program will assess change in material properties, loss of material, and reduction of heat transfer of mechanical systems and components. For systems in the scope of this program, an inspection will be conducted to confirm change in material properties, loss of material, and reduction of heat transfer of mechanical systems and components is not occurring, or the aging effect is occurring at a rate so as not to affect the system intended function. The program will provide inspection criteria, require evaluation of the results of the inspections, and provide recommendations for additional inspections, as necessary.

The initial inspections will be scheduled as close to the end of the current operating license as practical with margin provided to ensure completion prior to commencing the period of extended operation. Subsequent periodic inspections will be performed on a frequency not to exceed once every 10 years.

Aging Management Program Elements

(1) Scope of Activity: The scope of this activity includes systems in the scope of license renewal that require periodic monitoring of aging effects, and are not covered by other existing periodic monitoring programs. Inspections will be performed at susceptible locations in the system.

(2) Preventive Actions: The Periodic Inspection Program activities will be condition monitoring activities to detect degradation prior to change in material properties, loss of material, and reduction of heat transfer aging effects as applicable for the material and environment. No preventive or mitigating attributes are associated with the Periodic Inspection Program activities.

(3) Parameters Monitored/Inspected: The program will provide inspection for change in material properties, loss of material, and reduction of heat transfer. Inspections will be performed in accordance with station procedures that are based on applicable codes and standards, including ASME, and 10 CFR 50, Appendix B. Examination methods include visual examination, VT-1 or VT-3 of disassembled components or NDE (UT) measurements, as appropriate for detection of the specific aging effect.

(4) Detection of Aging Effects: Inspections for change in material properties, loss of material, and reduction of heat transfer will be performed on a representative sample of susceptible locations. Inspection for loss of material will consist of thickness measurements using nondestructive examination (UT) or visual examination (VT-1 or VT-3) of disassembled components.

Oyster Creek will perform periodic inspections of a representative sample of locations to confirm that unacceptable degradation is not occurring and the intended function of components will be maintained during the period of extended operation.

Unacceptable inspection results will require that the sample size and locations be expanded until the extent of the problems is determined. Engineering will determine the sample size and location expansion based on evaluations of the unacceptable inspection results.

The initial inspections will be performed near the end of the current operating term but before the period of extended operation. Subsequent periodic inspections will be performed on a frequency not to exceed once every 10 years.

(5) Monitoring and Trending: Results of the periodic piping inspection activities will be monitored. Indications of insufficient material wall thickness, change in material properties, and reduction of heat transfer in excess of established acceptance criteria will require initiation of an Issue Report for engineering evaluation. The engineering evaluation will either demonstrate acceptability or specify the appropriate repair or replacement. Issue Reports are trended within the corrective action program. Follow up examinations will be required if necessary to determine the extent of the degraded condition, thus expanding the sample size and locations of inspections.

(6) Acceptance Criteria: Results of the examinations will be evaluated by engineering to determine if change in material properties, loss of material, and reduction of heat transfer aging is occurring. If change in material properties, loss of material, and reduction of heat transfer aging is identified, engineering will determine the rate at which the aging effect's occurring. Engineering evaluations of the examination results will also a) determine the need for follow-up examinations to monitor the progression of aging degradation, and b) identify appropriate corrective actions to mitigate any excessive rates of change in material properties, loss of material, and reduction of heat transfer discovered or specify the appropriate repair or replacement. Corrective actions, if necessary, would expand to include other components.

Change in material properties, loss of material, and reduction of heat transfer will be evaluated by engineering consistent with original design or evaluation codes and criteria. Age related degradations that could result in a spatial interaction of a non-safety related system with a safety related system, as determined by this evaluation, would be corrected.

(7) Corrective Actions: Evaluations will be performed for inspection results that do not satisfy established criteria and an Issue Report is initiated to document the concern in accordance with the requirements of 10 CFR Part 50, Appendix B and in accordance with plant administrative procedures. The corrective actions program ensures that the conditions adverse to quality are promptly corrected. If the deficiency is assessed to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude repetition.

(8) Confirmation Process: Site quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

(9) Administrative Controls: See Item 8 above.

(10) Operating Experience: This is a new program. Therefore, no programmatic operating experience has been gained. Oyster Creek has experienced leaks of the plant heating system that resulted in the replacement of components. These plant heating system leaks were found and corrected in a timely manner and did not result in a loss of function of any safety-related systems, structures or components (SSCs). The Periodic Inspection aging management program is continually adjusted to account for industry and station experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

Enhancements

None.

Conclusion

The new Periodic Inspection Program will provide assurance that the system components are routinely inspected for age related degradation, and will adequately manage the identified aging effects. The program will provide reasonable assurance that system intended functions are maintained consistent with the current licensing basis during the period of extended operation.

B.2.6 WOODEN UTILITY POLE PROGRAM

Program Description

The new Oyster Creek Wooden Utility Pole Program will be used to manage loss of material and change of material properties for wooden utility poles in or near the Oyster Creek Substation which provide structural support for the conductors connecting the Offsite Power System and the 480/208/120V Utility (JCP&L) Non-Vital Power System to the Oyster Creek plant.

The program consists of inspection on a 10-year interval by a qualified inspector. The wooden poles will be inspected for loss of material due to ant, insect, and moisture damage and for change in material properties due to moisture damage. This new program will be implemented prior to the period of extended operation.

Aging Management Program Elements

(1) **Scope of Activity**: The Wooden Utility Pole Program applies to all wooden utility poles which support an intended function for the Offsite Power System and the 480/208/120V Utility (JCP&L) Non-Vital Power System.

(2) **Preventive Actions:** This program is a condition monitoring activity. It is a means of detecting, not preventing, aging and no preventive or mitigative actions are associated with the program.

(3) **Parameters Monitored or Inspected:** Wooden poles in scope of the program will be inspected for loss of material due to ant, insect, and moisture damage and for change in material properties due to moisture damage. The parameters monitored or inspected are capable of detecting the effects of aging.

(4) **Detection of Aging Effects:** Inspection of wooden poles every 10 years by a qualified inspector will assure that aging effects are detected prior to loss of intended function. Industry experience over several decades indicates that a 10-year inspection interval is adequate.

(5) **Monitoring and Trending**: Monitoring involves a combination of visual, sounding, boring, and excavation activities to determine the condition of the pole. These actions are sufficient to predict the extent of degradation so that timely corrective or mitigative actions are possible.

(6) **Acceptance Criteria:** The acceptance criteria will be provided in the specification for inspection of wooden poles carried out by approved wooden pole maintenance contractors experienced in the inspection, treatment, and reinforcement of wooden poles. The inspector, through a combination of visual, sounding, boring, and excavation activities, will determine the condition of the pole. Remedial actions are taken based on inspection findings.

(7) **Corrective Action:** If an inspection identifies a degraded condition, a

Corrective Action Program Issue Report will be initiated in accordance with 10 CFR Part 50, Appendix B plant administrative procedures. The degraded condition will be evaluated and corrective actions are taken as necessary.

(8) Confirmation Process: Site quality assurance procedures, review and approval processes and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

(9) Administrative Controls: See item (8), above.

(10) Operating Experience: While this is a new program, inspections of wooden utility poles as described above has been conducted by the industry for many years. Utility experience over several decades indicates that a 10-year inspection interval is adequate to detect age related degradation before a loss of intended function occurs.

Enhancements:

None.

Conclusion:

The Oyster Creek Wooden Utility Pole Program will effectively manage the aging of wooden utility poles so there is reasonable assurance that the intended functions of the Offsite Power System and the 480/208/120V Utility (JCP&L) Non-Vital Power System will be maintained consistent with the current licensing basis during the period of extended operation.

B.2.7 PERIODIC MONITORING OF COMBUSTION TURBINE POWER PLANT

Program Description

The Forked River Combustion Turbines (FRCTs), first installed in 1988, are owned, operated, and maintained by FirstEnergy and provide peak loading to the grid. Consistent with Oyster Creek Generating Station (OCGS) commitments, and as reviewed and approved by the NRC in its letters dated August 23, 1991 and February 12, 1992, the FRCTs also provide a standby source of alternate AC power for the Oyster Creek station in the event of a Station Blackout (SBO). The Interconnection Agreement between AmerGen and First Energy guarantees that SBO electric power from the FRCTs is available, when needed, to fulfill these objectives. The current Interconnection Agreement initially was executed between AmerGen and the prior FRCTs owner (Jersey Central Power and Light Company, GPU Energy) on October 15, 1999, and modified on April 14, 2000, to address SBO service. The SBO agreement continues until the date on which the Interconnection Agreement terminates or is terminated. The Interconnection Agreement continues in effect until all parties agree that NRC requirements and commitments have been satisfied, and the NRC authorizes termination, at such time that there is no longer any need for the SBO services under the agreement.

Pursuant to the terms of the Interconnection Agreement, FirstEnergy maintains and operates the FRCTs and makes them available at the onset of a Station Blackout condition, and for the required duration of at least four hours. In accordance with the Interconnection Agreement, FirstEnergy maintains the reliability of the FRCTs in accordance with NRC Maintenance Rule Performance Criteria, with an aggregate alternate AC source reliability of 0.95 (95%) per demand. In the event performance of one or both FRCTs is not within prescribed limits, FirstEnergy must promptly take any and all action required to bring performance within such limits. FirstEnergy maintains compliance with Appendices A and B of NRC Regulatory Guide 1.155 and Appendix B of NUMARC 87-00, which provide criteria to meet SBO requirements. The Interconnection Agreement also addresses certain operational requirements, such as manning the FRCTs four-hours in advance of a hurricane and providing remote and manual start capability. These provisions in the agreement ensure that the FRCTs are available as the alternate AC source in the event of SBO at OCGS.

Aging Management Program Elements

(1) Scope of Activity: The scope of this periodic monitoring aging management program (AMP) includes the Forked River Combustion Turbines power plant, including the associated systems, structures and components necessary for the FRCTs to provide alternate AC power to OCGS during a SBO. This AMP provides reasonable assurance that aging effects will be adequately managed, such that the FRCTs are available to perform this intended function.

(2) Preventive Actions: The activities performed as part of this AMP include preventive actions through maintenance activities and condition monitoring to detect degradation prior to loss of function of the FRCTs.

(3) Parameters Monitored/Inspected: The AMP includes the following activities, which are the responsibility of FirstEnergy in accordance with the Interconnection Agreement:

- Starting and bringing FRCTs to operating condition not less often than once every three months.
- Performing the following activities once every OCGS refueling outage:
  - A timed black start.
  - A simulated grid transient shutdown of the FRCTs with restart.
  - FRCT operation at no load and at required SBO load.

FirstEnergy maintains records of test results, as well as inspection and maintenance reports, and makes these records available for AmerGen and NRC review. Maintenance activities are coordinated with AmerGen and are scheduled such that at least one FRCT is available at all times.

(4) Detection of Aging Effects: Operational testing and post-maintenance or post-modification testing is performed as necessary, and corrective actions are taken when problems, including aging degradation, are identified. Periodic inspections and maintenance also identify any aging degradation that may occur and ensure that such degradation is evaluated and that prompt corrective actions are taken.

(5) Monitoring and Trending: Results of tests, inspections, and maintenance provide operating trends and data for reliability monitoring of the FRCTs. Results are documented for trending and operating experience purposes. The test records are reviewed by OCGS engineering to confirm and monitor the reliability of the FRCTs.

(6) Acceptance Criteria: Acceptance criteria are established for these inspection, testing, and maintenance activities to ensure that the FRCTs can start and provide power in accordance with the OCGS commitments for SBO. At least once every three months, the FRCTs are started and brought up to full synchronous speed and run for a minimum of 10 minutes. Each refueling outage, the FRCT function test confirms the FRCTs can be black started and loaded within one hour.

(7) Corrective Actions: In accordance with the Interconnection Agreement, maintenance activities are scheduled such that at least one combustion turbine will remain available at all times, and OCGS must be notified immediately if both combustion turbines become unavailable. If test acceptance criteria are not met, or any other deviation from proper operation during testing is noted, an Issue Report is initiated to document the concern in accordance with plant administrative procedures. The corrective actions program ensures that the conditions adverse to quality are promptly corrected. If the deficiency is assessed to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude recurrence. The SBO agreement ensures that the SBO equipment is covered by an appropriate quality assurance program consistent with the

OCGS commitments to classify and include the FRCTs in an appropriately graded quality assurance program, consistent with the applicable guidance in NRC Regulatory Guide 1.155. The NRC accepted this approach in its SBO supplemental safety evaluation dated February 12, 1992.

(8) Confirmation Process: OCGS confirms through its oversight and monitoring of the activities associated with the FRCTs that corrective actions have been taken and appropriately documented for any maintenance activities. As noted above, FirstEnergy maintains records of test results, as well as inspection and maintenance reports, and makes these records available for AmerGen and NRC review. Maintenance activities are coordinated with AmerGen and are scheduled such that at least one FRCT is available at all times. These activities are in accordance with the graded quality assurance approach accepted by the NRC.

(9) Administrative Controls: See Item 8 above.

(10) Operating Experience: Prior to GPU's sale of OCGS to AmerGen, a SBO System Performance Team identified and addressed certain operating experience issues that could impact FRCT reliability. The results of this Team's efforts were incorporated into the Interconnection Agreement. In addition, major inspection and maintenance of the FRCTs assures continued reliability. In October 2001 (Unit 2 FRCT) and March 2004 (Unit 1 FRCT), GE Energy Services performed major inspection and maintenance activities and documented all work performed in inspection reports dated January 4, 2002, and June 7, 2004, respectively. The equipment inspections included the turbine and its internals and support equipment. Acceptance criteria and corrective actions for these activities ensure that equipment is maintained within design specifications. The 2001 inspection involved extensive inspection, repair, and rework, including a borescope and combustion inspection, removal of exhaust frame cooling piping and disconnection of the fuel lines for inspection, and fuel nozzle inspection, repair, and testing. The 2004 inspection involved major rework and repair of the exhaust plenum after and forward walls, extensive repair welding of the exhaust diffuser, repairs of the exhaust duct expansion joints, complete rebuild and re-wiring of the load compartment and junction boxes, and extensive alignment activities. These major efforts ensured that the FRCTs were in optimal condition when returned to service.

Conclusion

The inspection, maintenance, and operational activities performed in accordance with the Interconnection Agreement provide assurance that the FRCTs will perform their intended function consistent with the current licensing basis throughout the period of extended operation.

B.3 <u>TLAA EVALUATION OF AGING MANAGEMENT PROGRAMS UNDER 10 CFR 54.21(C)(1)(III)</u>

B.3.1 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

Program Description

The Metal Fatigue of Reactor Coolant Pressure Boundary (MFRCPB) aging management program provides for monitoring select components in the reactor coolant pressure boundary by tracking and evaluating key plant events. Events were selected based upon plant-specific evaluations of the most fatigue-limited locations for critical components, including those discussed in NUREG/CR-6260, "Application of NUREG/CR-5999, Interim Fatigue Curves to Selected Nuclear Power Plant Components". The MFRCPB program monitors operating transients to-date, calculates fatigue usage factors to-date, and permits implementation of corrective measures in order not to exceed the design limit on fatigue usage. The effects of reactor coolant environment will be considered through the evaluation of, as a minimum, those components selected in NUREG/CR-6260 using the appropriate environmental fatigue factors. The design basis metal fatigue analyses for the reactor coolant pressure boundary are considered TLAAs for license renewal. The program provides an analytical basis for confirming that the number of cycles established by the analysis of record will not be exceeded before the end of the period of extended operation. In order to determine cumulative usage factors (CUFs) more accurately, the program will implement FatiguePro® fatigue monitoring software. FatiguePro calculates cumulative fatigue using both cycle-based and stress-based monitoring. This provides an analytical basis for confirming that the number of cycles established by the analysis of record will not be exceeded before the end of the period of extended operation.

NUREG-1801 Consistency

The Metal Fatigue of Reactor Coolant Pressure Boundary program is consistent with the ten elements of aging management program X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary", specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

The program will be enhanced to use the EPRI-licensed FatiguePro cycle counting and fatigue usage factor tracking computer program. The computer program provides for calculation of stress cycles and fatigue usage factors from operating cycles, automated counting of fatigue stress cycles and automated calculation and tracking of fatigue cumulative usage factors.

The program will provide for calculating and tracking of the cumulative usage factors for bounding locations for the reactor pressure vessel, Class I piping, the torus, torus vents, torus attached piping and penetrations, and the isolation condenser. The monitoring sample will include those locations where the predicted 40-year cumulative fatigue usage had been predicted to be 0.4 or greater, including the locations specified in NUREG/CR-6260, when applicable to Oyster Creek.

The enhancements will be implemented prior to the period of extended operation.

Operating Experience

Oyster Creek has reviewed both industry and plant-specific operating experience relating to the MFRCPB program. In instances where the potential existed to exceed CUFs before the end of plant life, the engineering analyses showed that actual margins were larger than initially estimated. The MFRCPB program has been revised to incorporate changes in design basis analysis cycles. The changes were made because certain types of operating events were found to be more frequent than anticipated in the original design. Others were found to be less frequent. The changes reduced the assumed design basis number of the less-frequent events and increased the assumed number of the more-frequent events.

In response to NRC concerns that early-life operating cycles at some units had caused fatigue usage factors to increase at a greater rate than anticipated in the design analyses, the industry sponsored the development of the FatiguePro computer program. The program is designed to ensure that the Code limits are not exceeded for the remainder of the licensed life and provides for incorporation of operating experience.

The MFRCPB program is continually adjusted to account for industry experience and research. As additional operating experience is obtained, lessons learned will be used to adjust this program as needed.

Conclusion

Implementation of the MFRCPB program provides reasonable assurance that the fatigue design limits will not be exceeded such that the components/commodities within the Reactor Coolant Pressure Boundary will continue to perform their intended functions consistent with the CLB for the period of extended operation. Program activities provide a proactive monitoring of fatigue stresses on key components chosen for their limiting nature on the design fatigue life of the plant.

Therefore, there is reasonable assurance that the MFRCPB program will manage aging effects such that systems, structures, and components within the scope of license renewal will continue to perform their intended functions consistent with the licensing basis for the period of extended operation.

B.3.2 ENVIRONMENTAL QUALIFICATION (EQ) PROGRAM

Program Description

The Environmental Qualification (EQ) Program is implemented through station procedures and preventive maintenance tasks. The Oyster Creek EQ Program complies with 10 CFR 50.49, "Environmental Qualification of Electrical Equipment Important to Safety for Nuclear Power Plants." All EQ equipment is included within the scope of license renewal. The program provides for maintenance of the qualified life for electrical equipment important to safety within the scope of 10 CFR 50.49. Program activities establish, demonstrate, and document the level of qualification, qualified configuration, maintenance, surveillance and replacement requirements necessary to meet 10 CFR 50.49. Reanalysis addresses attributes of analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, corrective actions if acceptance criteria are not met, and the period of time prior to the end of qualified life when the reanalysis will be completed. Qualified life is determined for equipment within the scope of the EQ Program and appropriate actions such as replacement or refurbishment are taken prior to or at the end of the qualified life of the equipment so that the aging limit is not exceeded.

The EQ Program addresses the low voltage I&C cable issues, consistent with those described in the closure of Generic Safety Issue 168 (GSI-168), "Environmental Qualification of Electrical Equipment".

NUREG-1801 Consistency

The Environmental Qualification (EQ) Program is consistent with the ten elements of aging management program X.E1, "Environmental Qualification (EQ) of Electrical Components," specified in NUREG-1801.

Exceptions to NUREG-1801

None.

Enhancements

None.

Operating Experience

The Environmental Qualification (EQ) Program provides for consideration of operating experience to reconcile qualification bases and conclusions, including the equipment qualified life. Operating experience and system, equipment or component related information, as reported through NRC Bulletins, Notices, Circulars, Generic Letters and Part 21 Notifications, are evaluated for applicability. The evaluations are documented and corrective actions are identified.

Operating experience is reviewed to determine if it is applicable to EQ Equipment. When problems have been identified through industry or plant-specific experience, corrective actions have been taken to prevent recurrence.

Conclusion

The Environmental Qualification (EQ) Program provides reasonable assurance that aging effects are adequately managed so that the intended functions of components within the scope of 10 CFR 50.49 are maintained consistent with the current licensing basis during the period of extended operation.