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United States Nuclear Regulatory Commission
Protecting People and the Environment

NUREG-2191, Volume 1
Revision 1

Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report

Draft Report for Comment

Office of Nuclear Reactor Regulation

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Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report

Draft Report for Comment

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Office of Nuclear Reactor Regulation

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Mail comments to: Houman Rasouli, Director, Program Management, Announcements and Editing Branch (PMAE), Office of Administration, Mail Stop: TWFN-7-A-60M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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ABSTRACT

This document provides guidance on the content of applications for renewal of the initial renewed operating license. The initial renewed operating license is the first renewed license issued under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," after either supersession or the expiration of the original operating license issued under either 10 CFR Part 50 or Part 52 following the completion of construction under a construction permit issued under Part 50, or a combined license issued under Part 52. In this guidance document, the renewal of the initial renewed operating license is referred to as "subsequent license renewal" (SLR). Draft NUREG–2191, Revision 1, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Draft Report for Comment" (GALL-SLR Report, Revision 1, GALL-SLR Report, or simply GALL-SLR) provides guidance for SLR applicants. The GALL-SLR Report contains the U.S. Nuclear Regulatory Commission (NRC) staff's generic evaluation of plant aging management programs (AMPs) and establishes the technical basis for their adequacy. The GALL-SLR Report contains recommendations about specific areas for which existing AMPs should be augmented for SLR. An applicant may reference this report in an SLR application to demonstrate that the AMPs at the applicant's facility correspond to those described in the GALL-SLR Report. If an applicant credits an AMP in the GALL-SLR Report, it is incumbent on the applicant to ensure that the conditions and operating experience at the plant are bounded by the conditions and OE for which the GALL-SLR Report program was evaluated. If these bounding conditions are not met, it is incumbent on the applicant to address any additional aging effects and augment the AMPs for SLR. For AMPs that are based on the GALL-SLR Report, the NRC staff will review and verify whether the applicant's AMPs are consistent with those described in the GALL-SLR Report, including applicable plant conditions and operating experience. The focus of the NRC staff's review of an SLR application is on the AMPs that an applicant has enhanced to be consistent with the GALL-SLR Report, the AMPs for which the applicant has taken an exception to the program described in the GALL-SLR Report, and plant-specific AMPs not described in the GALL-SLR Report.

This document is a companion document to Draft NUREG–2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants, Draft Report for Comment" (SRP-SLR), Revision 1, that provides guidance to NRC staff on the review of SLR applications. The guidance in this document is for the use of future applicants for SLR. The NRC does not intend to impose the guidance in this document on current holders of an initial operating license. However, this document encompasses all of the guidance applicable to initial license renewal. Accordingly, both current holders of initial operating licenses as well as future applicants for initial license renewal may voluntarily choose to reference an AMP in the GALL-SLR Report in their applications. However, such applicants should inform the NRC that they plan to demonstrate consistency with the GALL-SLR Report.

Drafts of GALL-SLR Report, Revision 0, and the SRP-SLR, Revision 0, were published for public comment in December 2015, and the comment period ended on February 29, 2016. The staff received more than 300 pages of comments from interested stakeholders. The comments were reviewed and dispositioned by the staff, and documented in NUREG-2222, "Disposition of Public Comments on the Draft Subsequent License Renewal Guidance Documents NUREG–2191 and NUREG–2192" (Agencywide Documents Access and Management System [ADAMS] Accession No. ML17362A143), in December 2017. The disposition of the comments was published in final NUREG-2191, Revision 0, (GALL-SLR Report, Rev. 0) (ADAMS Accession Nos. ML17187A031, and ML17187A204, for Volumes 1 and 2 respectively) in July 2017. The

companion document final SRP-SLR, Revision 0 (SRP-SLR, Rev. 0) (ADAMS Accession No. ML17188A158) was also issued in July 2017. The staff also published NUREG-2221, "Technical Bases for Changes in the Subsequent License Renewal Guidance Documents NUREG–2191 and NUREG–2192" (Technical Basis Document) (ADAMS Accession No. ML17362A126) in December 2017, that documented all the technical changes made to the license renewal guidance documents for SLR (i.e., for operation from 60 years to 80 years), along with the technical bases for the changes.

Subsequently, the NRC staff determined that certain revisions and updates to these guidance documents are warranted. These revisions and updates are presented in draft Revision 1 to the SRP-SLR and draft Revision 1 to the GALL-SLR. Comments on the revised documents will be considered, as appropriate, in the final versions of these documents. A draft supplement to the Technical Basis Document (NUREG-2221) was also published.

Paperwork Reduction Act Statement

This NUREG provides voluntary guidance for implementing the mandatory information collections in 10 CFR Part 51 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget (OMB) under control number 3150-0021. Send comments regarding these information collections to the FOIA, Library, and Information Collections Branch (T6A10M), U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or by email to Infocollects.Resource@nrc.gov, and to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0021). Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; email: oira_submission@omb.eop.gov.

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ABBREVIATIONS

AC	alternating current
ACAR	aluminum conductor aluminum alloy reinforced
ACSR	aluminum conductor steel reinforced
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act
AERM	aging effect requiring management
AFW	auxiliary feedwater
AISC	American Institute of Steel Construction
Al	Aluminum
AMP	aging management program
AMR	aging management review
ASME	American Society of Mechanical Engineers
ASME Code	American Society of Mechanical Engineers Boiler and Pressure Vessel Code
ASTM	ASTM International (formerly American Society for Testing and Materials)
AWG	American wire gauge
B&W	Babcock & Wilcox
BWR	boiling water reactor
BWRVIP	Boiling Water Reactor Vessel and Internals Project
CASS	cast austenitic stainless steel
CCCW	closed-cycle cooling water
CE	Combustion Engineering
CEA	control element assembly
CFR	*Code of Federal Regulations*
CFRP	carbon fiber reinforced polymer
CLB	current licensing basis
CRD	control rod drive
CRGT	control rod guide tube
CSE	copper/copper sulfate reference electrode
CUF	cumulative usage factor
CVCS	chemical and volume control system
DOE	U.S. Department of Energy
DOR	Division of Operating Reactors
ECT	eddy current testing
ECCS	emergency core cooling system
ECW	Emergency Chilled Water
EDG	emergency diesel generator
EMDA	Expanded Materials Degradation Assessment
EPDM	ethylene propylene diene monomer

EPR	ethylene-propylene rubber
EPRI	Electric Power Research Institute
EPT	ethylene propylene terpolymer
ETFE	ethylene tetrafluoroethylene
EQ	environmental qualification
FAC	flow-accelerated corrosionFDflow distributor
FERC	Federal Energy Regulatory Commission
FOIA	Freedom of Information Act
FRN	*Federal Register* notice
FSAR	Final Safety Analysis Report
FW	feedwater
GALL	Generic Aging Lessons Learned
GALL-SLR	Generic Aging Lessons Learned for Subsequent License Renewal
GL	generic letter
HDPE	high-density polyethylene
HPCI	high-pressure coolant injection
HPSI	high-pressure safety injection
HVAC	heating, ventilation, and air conditioning
I&E	inspection and evaluation
IAEA	International Atomic Energy Agency
IASCC	irradiation-assisted stress corrosion cracking
ICMH	incore-monitoring housing
ID	inside diameter
IE	irradiation embrittlement
IESRC	irradiation-enhanced stress relaxation or creep
IGA	intergranular attack
IGSCC	intergranular stress corrosion cracking
IS	inside surface
IAEA	International Atomic Energy Agency
IASCC	irradiation-assisted stress corrosion cracking
ICI	incore instruments
ID	inside diameter
IGSCC	intergranular stress corrosion cracking
IMI	incore monitoring instrumentation
ISG	interim staff guidance
ISI	inservice inspection
ISP	integrated surveillance program
LFET	low-frequency electromagnetic technique

LOCA	loss of coolant accident
LPCI	low-pressure coolant injection
LPSI	low-pressure safety injection
LRA	license renewal application
LR-ISG	license renewal interim staff guidance
LRT	leak rate test
LTOP	low temperature overpressure protection
LTS	lower thermal shield
LWR	light water reactor
MC	metal containment
MEB	metal enclosed bus
MIC	microbiologically influenced corrosion
MRP	Materials Reliability Program
MRV	minimum required value
MS	main steam
NACE	National Association of Corrosion Engineers
NDE	nondestructive examination
NEA	Nuclear Energy Agency
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPP	nuclear power plant
NPS	nominal pipe size
NRC	U.S. Nuclear Regulatory Commission
NSAC	Nuclear Safety Analysis Center
OCCW	open-cycle cooling water
OE	operating experience
OMB	Office of Management and Budget
PH	precipitation-hardening (or hardened)
PLL	predicted lower limit
PTFE	polytetrafluoroethylene elastomer
PTS	pressurized thermal shock
PVC	polyvinyl chloride
PWR	pressurized water reactor
QA	quality assurance
RCIC	reactor core isolation cooling
RCPB	reactor coolant pressure boundary
RCS	reactor coolant system
RES	Office of Nuclear Regulatory Research

RHR	residual heat removal
RPV	reactor pressure vessel
RT_{NDT}	reference nil-ductility temperature
RV	reactor vessel
RVI	reactor vessel internal
RWCU	reactor water cleanup
SBO	station blackout
SCs	structures and components
SCC	stress corrosion cracking
SDC	shutdown cooling
SER	Safety Evaluation Report
SFP	spent fuel pool
SG	steam generator
SIR	silicone rubber
SLC	standby liquid control
SLR	subsequent license renewal
SLRA	subsequent license renewal application
SOC	Statements of Consideration
SOER	significant operating experience report
SRM	source range monitor
SRM	staff requirements memorandum
SRP	Standard Review Plan
SRP-SLR	Standard Review Plan for Review of Subsequent License Renewal
SS	stainless steel
SSCs	systems, structures, and components
SSHT	surveillance specimen holder tube
TLAA	time-limited aging analysis
TR	Technical Report
TS	technical specification
UCB	upper core barrel
UHS	ultimate heat sink
USACE	U.S. Army Corps of Engineers
USAS	United States of America Standards
USE	upper-shelf energy
UT	ultrasonic testing
UTS	Unified Thread Standard
UV	ultraviolet
XLPE	cross-linked polyethylene

INTRODUCTION

Draft NUREG–2191, Revision 1, “Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR), Draft Report for Comment” (GALL-SLR Report, Revision. 1, GALL-SLR Report, or simply GALL-SLR), is referenced as a technical basis document in Draft NUREG–2192, Revision 1, “Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants, Draft Report for Comment” (SRP-SLR, Revision 1, or simply SRP-SLR). The GALL-SLR Report lists generic aging management reviews of systems, structures, and components (SSCs) that may be in the scope of subsequent license renewal applications (SLRAs) and identifies aging management programs (AMPs) that are determined to be acceptable for managing the effects of aging on SSCs in the scope of license renewal, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants.” If an applicant credits an AMP described in the GALL-SLR Report in the SLRA, the applicant should ensure that the conditions and operating experience at the plant are bounded by the conditions and operating experience for which the GALL-SLR Report program was evaluated. If these bounding conditions are not met, the applicant should address any additional aging effects and augment the AMPs for subsequent license renewal. If an SLRA references the approach described in the GALL-SLR Report as the approach used for managing the aging effect(s), the U.S. Nuclear Regulatory Commission staff will use the GALL-SLR Report as a basis for the SLRA assessment, consistent with guidance specified in the SRP-SLR.

BACKGROUND

The Atomic Energy Act of 1954, as amended, allows the U.S. Nuclear Regulatory Commission (NRC) to issue licenses for commercial nuclear power reactors to operate for up to 40 years. The NRC regulations permit these licenses to be renewed beyond the initial 40-year term for an additional period of time, limited to 20-year increments per renewal, based on the results of an assessment conducted to determine whether the nuclear facility can continue to operate safely during the proposed period of extended operation. There are no limitations in the Atomic Energy Act or the NRC regulations restricting the number of times a license may be renewed.

The focus of license renewal, as described in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, is to identify aging effects that could impair the ability of systems, structures, and components within the scope of license renewal to perform their intended functions, and to demonstrate that these effects will be adequately managed during the period of extended operation. The regulatory requirements for both initial and subsequent license renewal (SLR) are established by 10 CFR Part 54. To address the unique aspects of material aging and degradation that would apply to SLR (e.g., to permit plants to operate for up to 80 years), the Office of Nuclear Reactor Regulation requested support from the Office of Nuclear Regulatory Research to develop technical information to evaluate the feasibility of SLR. The Office of Nuclear Regulatory Research has memoranda of understanding with both the U.S. Department of Energy (DOE) and the Electric Power Research Institute to cooperate in conducting nuclear safety research related to long-term operations beyond 60 years. Under these memoranda, the NRC and the DOE held two international conferences, in 2008 and 2011, on reactor operations beyond 60 years. In May 2012, the NRC and the DOE also co-sponsored the Third International Conference on Nuclear Power Plant Life Management for Long-Term Operations, organized by the International Atomic Energy Agency (IAEA). In February 2013 and February 2015, the Nuclear Energy Institute held a forum on long-term operations and SLR. These conferences laid out the technical issues that would need to be addressed to provide assurance of safe operation beyond 60 years.

Based on the information gathered from these conferences and forums, and from other sources over the past several years, the most significant technical issues identified as challenging operation beyond 60 years are reactor pressure vessel embrittlement; irradiation-assisted stress corrosion cracking of reactor vessel internals; concrete structures and containment degradation; and electrical cable environmental qualification, condition monitoring and assessment. Throughout this process, the NRC staff has emphasized that it is the industry's responsibility to resolve these and other issues to provide the technical bases to ensure safe reactor operation beyond 60 years.

The NRC, in cooperation with the DOE, completed the Expanded Materials Degradation Assessment (EMDA) in 2014 (Agencywide Documents Access and Management System [ADAMS] Accession Nos. ML14279A321, ML14279A331, ML14279A349, ML14279A430, and ML14279A461). The EMDA uses an expert elicitation process to identify materials and components that could be susceptible to significant degradation during operation beyond 60 years. The EMDA covers the reactor vessel, primary system piping, reactor vessel internals, concrete, and electrical cables and qualification. The NRC staff used the results of the EMDA to identify gaps in the current technical knowledge or issues not being addressed by planned industry or DOE research, and to identify aging management programs (AMPs) that will require modification for SLR.

On May 9, 2012 (ADAMS Accession No. ML12158A545) and subsequently on November 1, 13, and 14, 2012, the NRC staff and interested stakeholders met to discuss issues and receive comments for consideration for SLR. The staff's resolution of and response to these public comments are available in the staff's memo dated September 12, 2016 (ADAMS Accession No. ML16194A222).

In addition to working with external stakeholders, the NRC staff conducted AMP effectiveness audits at three units that were at least 2 years into the period of extended operation. The purpose of these information-gathering audits was to better understand how licensees are implementing the license renewal AMPs, in terms of both the findings and the effectiveness of the programs, and to develop recommendations for updating license renewal guidance. The NRC staff used the information gathered from these audits to update the SLR guidance based on the staff's experience with the aging management activities during the first license renewals. A summary of the first two AMP effectiveness audits can be found in the May 2013 report, "Summary of Aging Management Program Effectiveness Audits to Inform Subsequent License Renewal: R.E. Ginna nuclear power plant and Nine Mile Point Nuclear Station, Unit 1" (ADAMS Accession No. ML13122A007). The summary of the third audit can be found in the August 5, 2014, report, "H.B. Robinson Steam Electric Plant, Unit 2, Aging Management Program Effectiveness Audit" (ADAMS Accession No. ML14017A289). In addition, on June 15, 2016, the staff issued the Technical Letter Report, "Review of Aging Management Programs: Compendium of Insight from License Renewal Applications and from AMP Effectiveness Audits Conducted to Inform Subsequent License Renewal Guidance Documents" (ADAMS Accession No. ML16167A076), which provides the staff's observations derived from reviewing license renewal applications and conducting the AMP effectiveness audits.

The NRC staff reviewed domestic operating experience (OE) as reported in licensee event reports and NRC generic communications related to failures and degradation of passive components. Similarly the NRC staff reviewed the following international OE databases: (1) International Reporting System, jointly operated by the IAEA; (2) IAEA's International Generic Ageing Lessons Learned Programme; (3) Organisation for Economic Co-operation and Development/Nuclear Energy Agency Component Operational Experience and Degradation and Ageing Programme database; and (4) Organisation for Economic Co-operation and Development/Nuclear Energy Agency Cable Aging Data and Knowledge database.

The NRC staff reviewed the results from AMP audits, findings from the EMDA, domestic and international OE, and public comments to identify technical issues that need to be considered when assuring the safe operation of NRC-licensed nuclear power plants. By letter dated August 6, 2014 (ADAMS Accession No. ML14253A104), the Nuclear Energy Institute documented the industry's views about and recommendations for updating NUREG–1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report," (ADAMS Accession No. ML103490041) (GALL Report, Rev. 2) and NUREG–1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," (ADAMS Accession No. ML103490036) (SRP-LR, Rev 2.) to support SLR. Between fiscal years 2014 and 2015, the NRC staff reviewed the comments and recommendations and drafted NUREG–2191, Revision 0, "Generic Aging Lessons Learned for Subsequent License Renewal Report" (GALL-SLR Report Rev. 0) to ensure that sufficient guidance was in place to support review of an SLR application in 2018 or 2019.

The staff requirements memorandum on SECY-14-0016, "Ongoing Staff Activities to Assess Regulatory Considerations for Power Reactor Subsequent License Renewal" (ADAMS Accession No. ML14241A578), directed the staff to continue to update the license

renewal guidance, as needed, to provide additional clarity about the implementation of the license renewal regulatory framework. The staff requirements memorandum also directed the staff to keep the Commission informed about the progress made in resolving the following technical issues related to SLR: (1) reactor pressure vessel neutron embrittlement at high fluence, (2) irradiation-assisted stress corrosion cracking of reactorvessel internals and primary system components, (3) concrete and containment degradation, and (4) electrical cable qualification and condition assessment. In addition, the staff requirements memorandum directed that the staff should keep the Commission informed regarding the staff's readiness to accept an application and any further need for regulatory process changes, rulemaking, or research.

During the staff's consideration of revisions to 10 CFR Part 54, changes to the License Renewal Rule were considered to address the provisions of 10 CFR 50.54(hh)(2) regarding guidance and strategies to maintain and restore core cooling, containment, and spent fuel cooling capabilities under the circumstances associated with the loss of large areas of the plant due to explosions or fires. After discussions with stakeholders and the public, it was concluded that these issues need not be addressed in the License Renewal Rule because emergency preparedness equipment is not identified in 10 CFR 54.4(a)(3). The 1995 *Federal Register* notice for the final license renewal rule, 60 FR 22461, 22468 states:

> Regarding systems, structures, and components required to make protective action recommendations, the Commission thoroughly evaluated emergency planning considerations in the previous license renewal rulemaking. These evaluations and conclusions are still valid and can be found in the [*Statements of Consideration*] SOC for the previous license renewal rule (56 FR 64943 at 64966). Therefore, the Commission concludes that systems, structures, and components required for emergency planning, unless they meet the scoping criteria in §54.4, should not be the focus of a license renewal review.

Further, even if this equipment is within the scope of license renewal, that does not necessarily mean that it is subject to aging management review based on the existing rule because only passive, long-lived structures and components are subject to an aging management review. Further, this is not an issue specific to SLR and is inconsistent with the first principle of license renewal (i.e., "….with the exception of age-related degradation and possibly a few other issues related to safety only during extended operation of nuclear power plants, the existing regulatory process is adequate to ensure that the licensing bases of all currently operating plants provide and maintain an acceptable level of safety so that operation will not be inimical to public health and safety or common defense and security"). Therefore, there is no need to address 10 CFR 50.54(hh) and diverse and flexible mitigation capability equipment in the License Renewal Rule.

On July 14, 2017 (82 FR 32588), the NRC announced the issuance and availability of the following final SLR guidance documents:

- Final NUREG–2191, Revision 0, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," (GALL-SLR Report, Rev. 0) (ADAMS Accession Nos. ML17187A031, and ML17187A204, for Volumes 1 and 2 respectively), and
- Final NUREG–2192, Revision 0, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants." (SRP-SLR, Rev. 0) (ADAMS Accession No. ML17188A158).

The GALL-SLR Report, Rev. 0, (Accession Nos. ML17187A031, and ML17187A204, for Volumes 1 and 2 respectively), and the companion document SRP-SLR, Revision 0 (SRP-SLR, Rev. 0) (Accession No. ML17188A158) were both issued in July 2017. The GALL-SLR Report, Rev. 0, includes the NRC staff's resolutions of License Renewal Interim Staff Guidance (LR-ISG) from 2011 through 2016. Under the ISG process, the NRC staff, industry, or stakeholders can propose a change to certain license renewal guidance documents. The NRC staff evaluates the issue, develops the proposed ISG, issues it for public comment, evaluates any comments received, and, if necessary, issues the final ISG.

The ISG is then used until the NRC staff incorporates the revised guidance into a formal license renewal guidance document revision. The ISGs addressed in the GALL-SLR Report, Rev. 0, are listed as follows:

- LR-ISG-2011-01: "Aging Management of Stainless Steel Structures and Components in Treated Borated Water, Revision 1." ADAMS Accession No. ML12286A275. December 18, 2012.
- LR-ISG-2011-02: "Aging Management Program for Steam Generators." ADAMS Accession No. ML11297A085. November 21, 2011.
- LR-ISG-2011-03: "Generic Aging Lessons Learned (GALL) Report Revision 2 AMP XI.M41," "Buried and Underground Piping and Tanks." ADAMS Accession No. ML12138A296. July 26, 2012.
- LR-ISG-2011-04: "Updated Aging Management Criteria for Reactor Vessel Internal Components of Pressurized Water Reactors." ADAMS Accession No. ML12270A436. May 28, 2013.
- LR-ISG-2011-05: "Ongoing Review of Operating Experience." ADAMS Accession No. ML12044A215. March 9, 2012.
- LR-ISG-2012-01: "Wall Thinning Due to Erosion Mechanisms." ADAMS Accession No. ML12352A057. April 25, 2013.
- LR-ISG-2012-02: Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation. ADAMS Accession No. ML13227A361. November 14, 2013.
- LR-ISG-2013-01: "Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers, and Tanks." ADAMS Accession No. ML14225A059. November 6, 2014.
- LR-ISG-2015-01: "Changes to Buried and Underground Piping and Tank Recommendations." ADAMS Accession No. ML15308A018. January 28, 2016.
- LR-ISG-2016-01: "Changes to Aging Management Guidance for Various Steam Generator Components." ADAMS Accession No. ML16237A383. November 30, 2016.

Subsequent to the issuance of GALL-SLR Report, Rev. 0, and SRP-SLR, Rev. 0, several more ISGs, each specifically referred to as Subsequent License Renewal Interim Staff Guidance (SLR-ISG), were proposed due to new or updated industry guidance, codes, or standards; relevant plant operating experience; incorporation of lessons learned from completed SLR application reviews; development of new aging management programs or aging management review items, and identification of required corrections and clarifications to the guidance. Additional updates of similar category were identified subsequent to SLR-ISG issuance. The staff determined that a revision (Revision 1) to the GALL-SLR Report, Rev. 0, and SRP-SLR,

Rev. 0, was warranted, to directly incorporate these additional updates and the issued SLR-ISGs listed below:

- SLR-ISG-2021-01-PWRVI: “Updated Aging Management Criteria for Reactor Vessel Internal Components of Pressurized Water Reactors of Subsequent License Renewal Guidance.” ADAMS Accession No. ML20217L203. January 8, 2021.
- SLR-ISG-2021-02-MECHANICAL: “Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance.” ADAMS Accession No. ML20181A434. February 18, 2021.
- SLR-ISG-2021-03-STRUCTURES: “Updated Aging Management Criteria for Structures Portions of Subsequent License Renewal Guidance.” ADAMS Accession No. ML20181A381. February 18, 2021.
- SLR-ISG-2021-04-ELECTRICAL: “Updated Aging Management Criteria for Electrical Portions of Subsequent License Renewal Guidance.” ADAMS Accession No. ML20181A395. February 18, 2021.

OVERVIEW OF THE GENERIC AGING LESSONS LEARNED FOR SUBSEQUENT LICENSE RENEWAL REPORT EVALUATION PROCESS

The Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report (GALL-SLR Report) contains 11 chapters and 2 appendices. Most of the chapters contain summary descriptions and tabulations of evaluations of aging management programs (AMPs) for a large number of structures and components (SCs) in major plant systems found in light-water reactor nuclear power plants. The major plant systems include the containment structures (Chapter II), SC supports (Chapter III), reactor vessel internals and reactor coolant system (Chapter IV), engineered safety features (Chapter V), electrical components (Chapter VI), auxiliary systems (Chapter VII), and steam and power conversion system (Chapter VIII).

Chapter I of the GALL-SLR Report addresses the application of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for subsequent license renewal (SLR). Chapter IX contains the description of a selection of standard terms used in the GALL-SLR Report. Chapter X contains examples of AMPs that may be used to demonstrate the acceptance of time-limited aging analyses in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 54.21(c)(1)(iii). Chapter XI contains the AMPs for the mechanical, structural, and electrical components. The appendices of the GALL-SLR Report address quality assurance for AMPs and operating experience.

The evaluation process for the AMPs and the application of the GALL-SLR Report is described in this document. The aging management review items for the GALL-SLR Report are presented in tabular format as described in Table 1. Table 1 describes the information presented in each column of the tables in Chapters II through VIII in this report.

Table 1 Aging Management Review Column Heading Descriptions

Column Heading	Description
New (N), Modified (M), Deleted (D), Edited (E) Item	Identifies the item as new to the GALL-SLR Report, Revision 1; modified from GALL-SLR Report, Revision 0; deleted from GALL-SLR Report, Revision 0; edited from GALL-SLR Report, Revision 0; or if blank, as unchanged from GALL-SLR Report, Revision 0.
Item	Identifies a unique number for the item (i.e., VII.G.A-91). The first part of the number indicates the chapter and aging management review system (e.g., VII.G is in the auxiliary systems, fire protection system), and the second part is a unique chapter-specific identifier within a chapter (e.g., A–91 for auxiliary systems).
Standard Review Plan (SRP) Item (Table, ID)	For each row in the subsystem tables, this item identifies the corresponding row identifier from the SRP-SLR to provide the crosswalk to the SRP system table items.
Structure and/or Component	Identifies the structure or components to which the row applies.
Material	Identifies the material of construction. See Chapter IX.C of this report for further information.
Environment	Identifies the environment applicable to this row. See Chapter IX.D of this report for further information.

Column Heading	Description
Aging Effect/ Mechanism	Identifies the applicable aging effect and mechanism(s). See Chapters IX.E and IX.F of this report for more information about applicable aging effects/mechanisms.
Aging Management Program (AMP)/TLAA	Identifies an AMP/TLAA found acceptable for adequately managing the effects of aging. See Chapters X and XI of this report.
Further Evaluation	Identifies whether a further evaluation is needed.

AMP = aging management program; GALL = Generic Aging Lessons Learned; SLR = subsequent license renewal; SRP = Standard Review Plan; TLAA = time-limited aging analysis.

The staff's evaluation of the adequacy of each generic AMP to manage certain aging effects for particular SCs is based on its review of the 10 program elements in each AMP, as defined in Table 2.

Table 2 Aging Management Programs Element Descriptions

AMP Element	Description
1. Scope of the Program	The scope of the program should include the specific structures and components subject to an aging management review.
2. Preventive Actions	Preventive actions should mitigate or prevent the applicable aging effects.
3. Parameters Monitored or Inspected	This identifies the aging effects that the program manages and provides a link between the parameter(s) that will be monitored and how the monitoring of these parameters will maintain adequate aging management.
4. Detection of Aging Effects	Detection of aging effects should occur before there is a loss of any intended function of a structure and component. This element describes aspects such as method or technique (i.e., visual, volumetric, surface inspection), frequency, sample size, data collection, and timing of new/one-time inspections to ensure timely detection of aging effects.
5. Monitoring and Trending	Monitoring and trending should provide for an estimate of the extent of the effects of aging and timely corrective or mitigative actions.
6. Acceptance Criteria	Acceptance criteria, against which the need for corrective action will be evaluated, should provide reasonable assurance that the particular structure and component's intended functions are maintained under all current licensing basis conditions during the subsequent period of extended operation.
7. Corrective Actions	Description of corrective actions that will be implemented if the acceptance criteria of the program are not met.
8. Confirmation Process	The confirmation process should provide reasonable assurance that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.
9. Administrative Controls	Administrative controls should provide a formal review and approval process.
10. Operating Experience (OE)	OE applicable to the aging management program (AMP), including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the intended function(s) of the structure or component will be maintained during the subsequent period of extended

AMP Element	Description
	operation. In addition, an ongoing review of both plant-specific and industry OE provides reasonable assurance that the AMP is effective in managing the aging effects for which it is credited. The AMP is enhanced or new AMPs are developed, as appropriate, when it is determined through the evaluation of OE that the effects of aging may not be adequately managed.

AMP = aging management program; OE = operating experience

Edited (E) items, in contrast to modified (M) items in the tables below, are those for which no technical aspects were changed. Examples of editorial changes include the following:

- Line item citations that were missed in SRP-SLR Table 3.X-1.
- Line item changes that only involved removing detail related to a Further Evaluation Recommended column after it was verified that the identical information was included in the SRP-SLR further evaluation section.
- Line item changes that only involved renumbering further evaluation sections.
- Aging effects changed from “and” to “or.” This could appear to be a technical change, but this is not the case because the staff confirmed that it was never the intent that both aging effects were occurring. For example, the “and” in cracking due to stress corrosion cracking and cyclic loading was replaced with “or.”
- Descriptors for the AMPs in the “Aging Management Program/ time-limited aging analyses” column were simplified if the information was provided elsewhere.
- Minor edits to component descriptions; for example: (a) deleting “elastomer” from “elastomer, elastomer seals;” (b) adding “piping” or “ducting” in front of the term “component.”

On the basis of its evaluation, if the staff determines that a program is adequate to manage certain aging effects for a particular SC without change, the “Further Evaluation” entry will indicate that no further evaluation is recommended for SLR.

Chapters X and XI of the GALL-SLR Report contain generic AMPs that the staff finds to be sufficient to manage aging effects in the subsequent period of extended operation, such as the ASME Code Section XI inservice inspection, water chemistry, or structures monitoring program.

EXPLANATION OF THE USE OF MULTIPLE AGING MANAGEMENT PROGRAMS IN AGING MANAGEMENT REVIEW ITEMS

For aging management review items associated with some “Further Evaluations,” the associated “Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report” (GALL-SLR Report) items now include a letter suffix with the unique chapter-specific identifier. For these items, the staff designated the various aging management programs (AMPs) it found to be acceptable in lieu of specifying “plant-specific aging management program” in the Aging Management Program column. Depending on the GALL-SLR Report Table 2 item cited in the subsequent license renewal application (SLRA) for these items, applicants can either use one of the AMPs found to be acceptable to the staff for specific situations or, comparable to any other item, can propose their own plant-specific program to manage the associated aging effect.

For example, “Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants (SRP-SLR)” Section 3.1.2.2.16 is a further evaluation associated with Standard Review Plan for Review of Subsequent License Renewal Item 3.1-1, 136, for loss of material due to pitting and crevice corrosion in stainless steel and nickel alloy piping and piping components. The associated chapter-specific identifier has been expanded to include Items R-452a, R-452b, R-452c, and R-452d. The further evaluation recommends a review of plant-specific operating experience to determine whether the site’s air environments are sufficiently aggressive to cause pitting and crevice corrosion. The need to manage this aging effect will depend on the results of the operating experience reviews and a one-time inspection to demonstrate that pitting and crevice corrosion are not occurring or are occurring sufficiently slowly. Consequently, the acceptable AMP could be XI.M32 for performing the one-time inspection (if the aging effect does not need to be periodically managed), or it could be XI.M36, XI.M38, or XI.M42, depending on whether a periodic program is needed for external surfaces, internal surfaces, or coatings/linings. The SLRA will specify the applicable AMP by citing the specific GALL-SLR Item R-452a, R-452b, R-452c, or R-452d for the corresponding AMP being used at the site. More specifically, if the plant-specific operating experience review does not reveal any instances of loss of material for stainless steel or nickel alloy piping and piping components, R-452a (AMP XI.M32) would be the cited SLRA aging management review Table 2 item. In contrast, if external loss of material has occurred, and the loss was sufficient to potentially affect the intended function, R-452b (AMP XI.M36) or R-452d (AMP XI.M42) would be cited.

REFERENCES

References are listed for each aging management program following the program elements. References consist of documents (e.g., codes, standards) associated with recommended actions (e.g., qualification of personnel, inspection methods) cited in the program elements or documents containing background information associated with the aging management program (e.g., Information Notices). The specific version (e.g., edition, addendum, revision) of a reference is cited in the list of references. Note that in some instances, specific program elements might cite a different version of a reference than that cited in the reference list. In such cases, the staff has reviewed the provisions of the different versions of the reference and has specifically cited a version based on the requirements or guidance contained in the document. Where a specific version is not cited under a program element, the version cited in the reference list is applicable. With the exception of the guidance about use of later editions/revisions of various industry documents cited below, an applicant should identify exceptions to the Generic Aging Lessons Learned for Subsequent License Renewal Report and provide justification when using a different version of a reference cited in the program elements.

GUIDANCE ON USE OF LATER EDITIONS/REVISIONS OF VARIOUS INDUSTRY DOCUMENTS

To aid applicants in the development of their subsequent license renewal applications (SLRAs), the staff has developed a list of aging management programs in the "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report" (GALL-SLR Report) that are based entirely or in part on specific editions/revisions of various industry codes (other than the American Society of Mechanical Engineers Boiler and Pressure Vessel Code), standards, and other industry-generated guidance documents. SLRAs may use later editions/revisions of these industry-generated documents, subject to the following provisions:

i. If the later edition/revision has been explicitly reviewed and approved/endorsed by the U.S. Nuclear Regulatory Commission (NRC) staff for license renewal via an NRC Regulatory Guide endorsement, a safety evaluation for generic use (such as for a Boiling Water Reactor Vessel and Internals Project (BWRVIP) report], incorporation into Title 10 of the *Code of Federal Regulation* (10 CFR), or license renewal interim staff guidance.

ii. If the later edition/revision has been explicitly reviewed and approved on a plant-specific basis by the NRC staff in its Safety Evaluation Report for another applicant's SLRA (a precedent exists), applicants may reference it and justify its applicability to their facility via the exception process in Nuclear Energy Institute Guideline 95-10.

If either of these methods is used as justification for adopting a later edition/revision than that specified in the GALL-SLR Report, the applicant shall reference the information pertaining to the NRC endorsement/approval of the later edition/revision.

APPLICATION OF THE GENERIC AGING LESSONS LEARNED FOR SUBSEQUENT LICENSE RENEWAL (GALL-SLR) REPORT

The "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report" (GALL-SLR Report) is a technical basis document to the Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants, which provides the staff with guidance when reviewing a subsequent license renewal application (SLRA). The GALL-SLR Report should be treated in the same manner as an approved topical report that is generically applicable. An applicant may reference the GALL-SLR Report in an SLRA to demonstrate that the aging management programs (AMPs) at the applicant's facility correspond to those reviewed and approved in the GALL-SLR Report.

If an applicant takes credit for an AMP in the GALL-SLR Report, it is incumbent on the applicant to ensure that the plant AMP contains all the elements of the referenced GALL-SLR program. In addition, the conditions and operating experience (OE) at the plant must be bounded by the conditions and OE for which the GALL-SLR Report AMP was evaluated; otherwise it is incumbent on the applicant to augment the GALL-SLR Report AMP as appropriate to address the impact of the plant-specific OE on the AMP element criteria. The documentation for the above verifications must be available onsite in an auditable form.

The GALL-SLR Report contains one acceptable way to manage aging effects for subsequent license renewal (SLR). An applicant may propose alternatives for staff review in its plant-specific SLRA. The use of the GALL-SLR Report is not required, but its use should facilitate both preparation of an SLRA by an applicant and timely, consistent review by the U.S. Nuclear Regulatory Commission staff.

The GALL-SLR Report does not address the scoping of structures and components for license renewal; this is addressed in Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants Chapter 2. Scoping is plant-specific, and the results depend on the plant design and current licensing basis. The inclusion of a certain structure or component in the GALL-SLR Report does not imply that the particular structure or component is within the scope of license renewal for all plants. Conversely, the omission of a certain structure or component from the GALL-SLR Report does not imply that the particular structure or component is not within the scope of SLR for any plants.

The GALL-SLR Report contains an evaluation of a large number of structures and components s that may be in the scope of a typical SLRA. The evaluation results documented in the GALL-SLR Report indicate that many existing, typical generic AMPs are adequate for managing aging effects for particular structures or components for SLR without change. The GALL-SLR Report also contains recommendations about specific areas for which existing generic AMPs should be augmented (require further evaluation) for SLR and documents the technical basis for each such determination. The GALL-SLR Report identifies certain systems, structures, and components that may or may not be subject to particular aging effects, and those for which industry is developing generic AMPs or investigating whether aging management is warranted.

Appendix A of the GALL-SLR Report addresses quality assurance (QA) for AMPs. The aspects of the aging management review process that affect the quality of safety-related SSCs are subject to the QA requirements of Appendix B to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50. For nonsafety-related SCs subject to an aging management review, the existing 10 CFR Part 50, Appendix B, QA program may be used by an applicant to address the elements of the corrective actions, confirmation process, and administrative controls for an AMP for SLR.

The GALL-SLR Report provides a technical basis for crediting existing plant AMPs and recommending areas for AMP augmentation and further evaluation. The incorporation of the GALL-SLR Report information into the SRP-SLR, as directed by the Commission, should improve the efficiency of the SLR review process and the associated use of staff resources.

CHAPTER I

APPLICATION OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE

I APPLICATION OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Division 1, Sections III (design) and XI (inservice inspection requirements) were developed and are revised periodically by industry code committees composed of representatives of utilities, reactor designers, architect-engineers, component manufacturers, insurance companies, the U.S. Nuclear Regulatory Commission (NRC), and others. In 1971, the Atomic Energy Commission, the predecessor of the NRC, incorporated the ASME Code into the regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a through issuance of the *Federal Register* notice (FRN) for the Final Rule (36 FR 11423 [June 12, 1971]).

The statement of consideration for the initial issuance of 10 CFR 50.55a provides the bases for the Atomic Energy Commission's endorsement and use of the ASME Code:

> It has been generally recognized that, for boiling and pressurized water-cooled reactors, pressure vessels, piping, pumps, and valves which are part of the reactor coolant pressure boundary should, as a minimum, be designed, fabricated, inspected, and tested in accordance with the requirements of the applicable American Society of Mechanical Engineers (ASME) codes in effect at the time the equipment is purchased[.]
>
> Because of the safety significance of uniform early compliance by the nuclear industry with the requirements of these ASME codes and published code revisions, the Commission has adopted the following amendments to Part 50 and 115, which require that certain components and systems of water-cooled reactors important to safety comply with these codes and appropriate revisions to the codes at the earliest feasible time.
>
> Compliance with the provisions of the amendments and the referenced codes is intended to insure a basic, sound quality level.

These ASME Code sections are based on the collective engineering judgment of the code committees, and they document the conditions that must be monitored, the inspection techniques to identify those conditions, the frequency of the inspections, and the acceptance criteria that the inspection results must meet in order to assure the integrity of the structures and components considered in the code. The NRC has accepted this engineering judgment by endorsing the use of selected sections of the ASME Code, as incorporated in 10 CFR 50.55a.

In addition, the NRC periodically amends 10 CFR 50.55a and issues FRNs about this rule in order to incorporate by reference, newer editions and ASME Code addenda subject to the modifications and limitations identified in 10 CFR 50.55a. As stated in 65 FR 53050 (August 31, 2000):

> To ensure that the GALL report conclusions will remain valid when future editions of the ASME Code are incorporated into the NRC regulations by the 10 CFR 50.55a rulemaking, the staff will perform an evaluation of these later editions for their adequacy for license renewal using the 10-element program evaluation described in the GALL Report as part of the 10 CFR 50.55a rulemaking.

The staff will continue to evaluate future editions of the ASME Code for their adequacy for subsequent license renewal (SLR), and will document their evaluation in the. statements of consideration accompanying future 10 CFR 50.55a amendments, which will be published in a FRN.

References to American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI Used in This Report

To aid applicants in the development of their subsequent license renewal applications (SLRAs), the staff has developed a list of aging management programs (AMPs) in the Generic Aging Les sons Learned for Subsequent License Renewal (GALL-SLR) Report that are based on consistency with the 10 program element criteria defined in Section A.1.2.3 of the Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants. Some of the AMPs referenced in the GALL-SLR Report are based entirely or in part on compliance with the requirements of ASME Code Section XI, as endorsed for use through reference in 10 CFR 50.55a. In some cases, the staff has determined that specific requirements in ASME Code Section XI need to be augmented to ensure adequate aging management consistent with the requirements of the License Renewal Rule. Thus, some of the AMPs in the GALL-SLR Report also provide guidance on augmenting the requirements of ASME Code Section XI. The staff has determined that in most cases the ASME Code Section XI requirements referenced in Table I-1 provide an acceptable basis for managing the effects of aging during the subsequent period of extended operation, except where noted and augmented in the GALL-SLR Report. Therefore, except where noted (see below) and augmented in the GALL-SLR Report, the ASME Code Section XI editions and addenda listed in Table I-1, subject to the modifications and limitations in 10 CFR 50.55a, should be treated as being consistent with the GALL-SLR Report, and an applicant need not identify exceptions when using these specific editions and addenda. Note that in some instances, AMPs have been augmented by referencing an edition or addendum beyond that referenced in Table I-1. In such cases, the staff has reviewed the provisions of the later code and has specifically cited the later edition or addendum based on the requirements contained within that version of ASME Code Section XI. In order for an applicant's program to be consistent with such an AMP, the later edition or addendum should be cited.

An applicant should identify exceptions to the GALL-SLR Report and provide justification when using any ASME Code Section XI edition or addendum not listed in Table I-1 or specifically cited in a GALL-SLR Report AMP. With respect to more recent (beyond those already cited in a GALL-SLR Report AMP) ASME Code Section XI editions and addenda, the NRC will update Table I-1 through either a published revision to the GALL-SLR Report or through the license renewal interim staff guidance process after the staff has evaluated the specific ASME Code Section XI edition or addendum and determined the extent to which it is adequate for license renewal.

Updates to the American Society of Mechanical Engineers Code of Record During U.S. Nuclear Regulatory Commission's Review of Subsequent License Renewal Applications

Pursuant to 10 CFR 50.55a(g)(4), a nuclear licensee is required to amend its current licensing basis (CLB) by updating its ASME Code Section XI edition and addenda of record to the most recently endorsed edition and addenda referenced in 10 CFR 50.55a on a periodic basis. Pursuant to 10 CFR 54.21(b), an applicant for license renewal is required to periodically submit updates of its SLRA to identify any changes in its CLB that materially affect the contents of the SLRA. The rule requires an update of the SLRA each year following the submittal of the

application and an additional update 3 months prior to the completion of the NRC's review of the SLRA. If an applicant's ASME Code Section XI edition of record is updated under the requirements of 10 CFR 50.55a(g)(4) during the NRC's review of the SLRA, the applicant should update the AMPs in the SLRA that are affected by this change in the CLB when the applicant submits the next update of the SLRA required by 10 CFR 54.21(b).

Effective Period for Approved Relief Requests and Code Cases

The current regulatory process, including 10 CFR 50.55a, continues into the subsequent period of extended operation. The NRC Director of the Office of Nuclear Reactor Regulation may authorize a licensee-proposed alternative to ASME Code Section XI if it is submitted as an alternative in accordance with 10 CFR 50.55a(a)(3). The staff's authorization of an alternative program typically does not extend beyond the inservice inspection interval for which the alternative was proposed. For cases in which this interval extends beyond the renewed license period into the subsequent period of extended operation, the approved alternative remains in effect until the end of that interval, consistent with the specific approval (60 FR 22461, 22483).

Pursuant to 10 CFR 50.55a(b)(5), licensees may apply ASME Code cases listed in NRC Regulatory Guide 1.147, through the most recent endorsed revision, without NRC authorization, subject to the limitations contained in the rule. The rule permits licensees to continue to apply the Code case, or a most recent version that is incorporated by the Regulatory Guide, until the end of the inservice inspection interval. For cases in which this interval extends beyond the renewed license period into the subsequent renewed license period, the Code case, or a more recent endorsed version, remains in effect until the end of that interval, consistent with 10 CFR 50.55a(b)(5) and the statements of consideration for the final License Renewal Rule 60 FR 22461.

Table I-1 ASME Code Section XI Editions and Addenda that Are Acceptable for Use in AMPs

Acceptable Editions and Addenda	Basis	Conditions or Limitations for License Renewal
1995 Edition 1996 Addenda 1997 Addenda 1998 Edition 1999 Addenda 2000 Addenda	67 FR 60520 (September 26, 2002)	None beyond what is specified in 10 CFR 50.55a
2001 Edition 2002 Addenda 2003 Addenda	69 FR 58804 (October 1, 2004)	None beyond what is specified in 10 CFR 50.55a
2004 Edition	73 FR 52730 (September 10, 2008)	None beyond what is specified in 10 CFR 50.55a
2005 Addenda 2006 Addenda 2007 Edition 2008 Addenda	76 FR 36266 (June 21, 2011)	None beyond what is specified in 10 CFR 50.55a
2009 Addenda 2010 Edition 2011 Addenda 2013 Edition	82 FR 32934 (July 18, 2017)	None beyond what is specified in 10 CFR 50.55a
2015 Edition 2017 Edition	85 FR 26540 (May 4, 2020)	None beyond what is specified in 10 CFR 50.55a
2019 Edition	If and when published	None beyond what is specified in 10 CFR 50.55a

CHAPTER II

CONTAINMENT STRUCTURES

CHAPTER II CONTAINMENT STRUCTURES

A PRESSURIZED WATER REACTOR CONTAINMENTS

B BOILING WATER REACTOR CONTAINMENTS

A PRESSURIZED WATER REACTOR CONTAINMENTS

A1. CONCRETE CONTAINMENTS (REINFORCED AND PRESTRESSED)

A2. STEEL CONTAINMENTS

A3. COMMON COMPONENTS

A PRESSURIZED WATER REACTOR CONTAMINANTS

A1 CONCRETE CONTAINMENTS (REINFORCED AND PRESTRESSED)

Systems, Structures, and Components

This section addresses the elements of pressurized water reactor concrete containment structures. Concrete containment structures are divided into three elements: (1) concrete, (2) steel, and (3) prestressing systems.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation components (V.C), and the containment spray system (V.A). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B1) and the feedwater system (VIII.D1), or is supported by the containment structure, such as cranes (VII.B). The containment structure basemat typically provides support to the nuclear steam supply system components and containment internal structures.

Table A.1 Concrete Containments (Reinforced and Prestressed)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analyses (TLAA)	Further Evaluation
-	II.A1.CP-87	3.5-1, 016	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.A1.CP-31	3.5-1, 018	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.A1.CP-33	3.5-1, 019	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.A1.CP-32	3.5-1, 020	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
M	II.A1.CP-68	3.5-1, 021	Concrete (accessible areas): dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analyses (TLAA)	Further Evaluation
-	II.A1.CP-100	3.5-1, 024	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Air – indoor uncontrolled, air – outdoor, groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No
M	II.A1.CP-147	3.5-1, 011	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
M	II.A1.CP-67	3.5-1, 012	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analyses (TLAA)	Further Evaluation
							XI.S6, "Structures Monitoring," enhanced as necessary	
M	II.A1.CP-102	3.5-1, 014	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
-	II.A1.CP-97	3.5-1, 023	Concrete (inaccessible areas): dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete	Any	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No
M	II.A1.CP-34	3.5-1, 003	Concrete: dome; wall; basemat; ring girders; buttresses	Concrete	Air – indoor uncontrolled, air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded, or AMP XI.S2, "ASME Section XI,	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analyses (TLAA)	Further Evaluation
							Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	
-	II.A1.CP-101	3.5-1, 001	Concrete: dome; wall; basemat; ring girders; buttresses	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	Yes
-	II.A1.C-07	3.5-1, 002	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	II.A1.C-11	3.5-1, 008	Prestressing system: tendons	Steel	Air – indoor uncontrolled, air – outdoor	Loss of prestress due to relaxation; shrinkage; creep; elevated temperature	TLAA, SRP-SLR Section 4.5, "Concrete Containment Tendon Prestress," and/or SRP-SLR Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analyses (TLAA)	Further Evaluation
-	II.A1.C-10	3.5-1, 032	Prestressing system: tendons; anchorage components	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.A1.CP-35	3.5-1, 035	Steel elements (accessible areas): liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.A1.CP-98	3.5-1, 005	Steel elements (inaccessible areas): liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan for Review of Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

A2 STEEL CONTAINMENTS

Systems, Structures, and Components

This section addresses the elements of pressurized water reactor steel containment structures. Steel containment structures are divided into two elements: (1) steel and (2) concrete.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation components (V.C), and the containment spray system (V.A). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B1) and the feedwater system (VIII.D1), or is supported by the containment structure, such as cranes (VII.B). The containment structure basemat typically provides support to the nuclear steam supply system components and containment internal structures.

Table A.2 Steel Containments

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.A2.CP-51	3.5-1, 018	Concrete (accessible areas): basemat	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.A2.CP-58	3.5-1, 019	Concrete (accessible areas): basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.A2.CP-72	3.5-1, 016	Concrete (accessible areas): basemat	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.A2.CP-155	3.5-1, 020	Concrete (accessible areas): basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.A2.CP-74	3.5-1, 021	Concrete (accessible areas): basemat; reinforcing steel	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
M	II.A2.CP-70	3.5-1, 011	Concrete (inaccessible areas): basemat	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.A2.CP-104	3.5-1, 012	Concrete (inaccessible areas): basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	II.A2.CP-71	3.5-1, 024	Concrete (inaccessible areas): basemat	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
M	II.A2.CP-53	3.5-1, 014	Concrete (inaccessible areas): basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.A2.CP-75	3.5-1, 023	Concrete (inaccessible areas): basemat; reinforcing steel	Concrete	Any	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.A2.CP-69	3.5-1, 001	Concrete: basemat	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	Yes
-	II.A2.C-07	3.5-1, 002	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	II.A2.CP-35	3.5-1, 035	Steel elements (accessible areas): liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.A2.CP-98	3.5-1, 005	Steel elements (inaccessible areas): liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*: SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A3 COMMON COMPONENTS

Systems, Structures, and Components

This section addresses the common components of pressurized water reactor containment structures. The common components include (1) penetration sleeves and bellows, (2) dissimilar metal welds, (3) personnel airlock, (4) equipment hatch, (5) seals, (6) gaskets, and (7) moisture barriers.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation components (V.C), and the containment spray system (V.A). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B1) and the feedwater system (VIII.D1), or is supported by the containment structure, such as cranes (VII.B). The containment structure basemat typically provides support to the nuclear steam supply system components and containment internal structures.

Table A.3 Common Components

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.A3.CP-37	3.5-1, 027	Metal liner, metal plate, airlock, equipment hatch, control rod drive (CRD) hatch; penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Cracking due to cyclic loading (current licensing basis [CLB] fatigue analysis does not exist)	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.A3.C-13	3.5-1, 009	Metal liner, metal plate, personnel airlock, equipment hatch, CRD hatch, penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Cumulative fatigue damage due to fatigue (Only if CLB fatigue analysis exists)	TLAA, SRP-SLR Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis"	Yes
-	II.A3.CP-40	3.5-1, 026	Moisture barriers (caulking, flashing, other sealants)	Elastomer, rubber and other similar materials	Air – indoor uncontrolled	Loss of sealing due to wear, damage, erosion, tear, surface cracks, other defects	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.A3.CP-36	3.5-1, 035	Penetration sleeves	Steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.A3.CP-38	3.5-1, 010	Penetration sleeves; penetration bellows	Stainless steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Cracking due to stress corrosion cracking	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.A3.C-16	3.5-1, 028	Personnel airlock, equipment hatch, CRD hatch	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No
-	II.A3.CP-39	3.5-1, 029	Personnel airlock, equipment hatch, CRD hatch: locks, hinges, closure mechanisms	Steel	Air – indoor uncontrolled, air – outdoor	Loss of leak tightness due to mechanical wear	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No
-	II.A3.CP-148	3.5-1, 031	Pressure-retaining bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.A3.CP-150	3.5-1, 030	Pressure-retaining bolting	Steel	Any	Loss of preload due to self-loosening	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No
-	II.A3.CP-41	3.5-1, 033	Seals and gaskets	Elastomer, rubber and other similar materials	Air – indoor uncontrolled, air – outdoor	Loss of sealing due to wear, damage, erosion, tear, surface cracks, other defects	AMP XI.S4, "10 CFR Part 50, Appendix J"	No
-	II.A3.CP-152	3.5-1, 034	Service Level I coatings	Coatings	Air – indoor uncontrolled, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage	AMP XI.S8, "Protective Coating Monitoring and Maintenance"	No

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; CLB = current licensing basis; CRD = control rod drive; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan for Review of Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

B BOILING WATER REACTOR CONTAINMENTS

B1 MARK I CONTAINMENTS

B2 MARK II CONTAINMENTS

B3 MARK III CONTAINMENTS

B4 COMMON COMPONENTS

B BOILING WATER REACTOR CONTAINMENTS

B1 MARK I CONTAINMENTS

Systems, Structures, and Components

This section addresses the elements of boiling water reactor Mark I containment structures. Steel containments are discussed in B.1 and concrete containments are discussed in B.2.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation components (V.C), and the standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and the feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the nuclear steam supply system components and containment internal structures.

Table B.1 Mark I Steel Containments

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B1.1.CP-43	3.5-1, 035	Steel elements (accessible areas): drywell shell; drywell head; drywell shell in sand pocket regions	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B1.1.C-23	3.5-1, 036	Steel elements: drywell head; downcomers	Steel	Air – indoor uncontrolled	Loss of material due to mechanical wear, including fretting	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.B1.1.CP-44	3.5-1, 041	Steel elements: drywell support skirt	Steel	Concrete	None	None	No
-	II.B1.1.CP-109	3.5-1, 007	Steel elements: torus ring girders; downcomers;	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE"	Yes
-	II.B1.1.CP-48	3.5-1, 006	Steel elements: torus shell	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
M	II.B1.1.CP-49	3.5-1, 027	Steel elements: torus; vent line; vent header; vent line bellows; downcomers	Steel; stainless steel	Air – indoor uncontrolled	Cracking due to cyclic loading (current licensing basis [CLB] fatigue analysis does not exist)	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B1.1.C-21	3.5-1, 009	Steel elements: torus; vent line; vent header; vent	Steel; stainless steel	Air – indoor uncontrolled	Cumulative fatigue damage due to fatigue (Only if CLB	TLAA, SRP-SLR Section 4.6, "Containment	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
			line bellows; downcomers			fatigue analysis exists)	Liner Plate and Penetration Fatigue Analysis"	
-	II.B1.1.CP-50	3.5-1, 039	Steel elements: vent line bellows	Stainless steel	Air – indoor uncontrolled	Cracking due to stress corrosion cracking	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulation*; CLB = current licensing basis; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan for Review of Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

1 **Table B.2 Mark I Concrete Containments**

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B1.2.CP-79	3.5-1, 021	Concrete (accessible areas): basemat; reinforcing steel	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B1.2.CP-59	3.5-1, 019	Concrete (accessible areas): containment; wall; basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B1.2.CP-54	3.5-1, 020	Concrete (accessible areas): containment; wall; basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B1.2.CP-80	3.5-1, 023	Concrete (inaccessible areas): basemat; reinforcing steel	Concrete	Any	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B1.2.CP-99	3.5-1, 012	Concrete (inaccessible areas): containment; wall; basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
M	II.B1.2.CP-110	3.5-1, 014	Concrete (inaccessible areas): containment; wall; basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
-	II.B1.2.CP-105	3.5-1, 001	Concrete elements: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B1.2.CP-57	3.5-1, 003	Concrete: containment; wall; basemat	Concrete	Air – indoor uncontrolled, air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	II.B1.2.CP-106	3.5-1, 016	Concrete: containment; wall; basemat	Concrete	Air – indoor uncontrolled, air – outdoor, groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.B1.2.C-07	3.5-1, 002	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B1.2.CP-46	3.5-1, 035	Steel elements (accessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B1.2.CP-114	3.5-1, 041	Steel elements (inaccessible areas): support skirt	Steel	Concrete	None	None	No
-	II.B1.2.CP-63	3.5-1, 005	Steel elements (inaccessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B1.2.CP-117	3.5-1, 031	Steel elements: downcomer pipes	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.B1.2.C-23	3.5-1, 036	Steel elements: drywell head; downcomers	Steel	Air – indoor uncontrolled	Loss of material due to mechanical wear, including fretting	AMP XI.S1, "ASME Section XI, Subsection IWE"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B1.2.C-49	3.5-1, 037	Steel elements: suppression chamber (torus) liner (interior surface)	Steel; stainless steel	Air – indoor uncontrolled, treated water	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

B2 MARK II CONTAINMENTS

Systems, Structures, and Components

This section addresses the elements of boiling water reactor Mark II containment structures. Mark II steel containments are discussed in Table B.3. Mark II concrete containments are discussed in Table B.4.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation components (V.C), and the standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and the feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the nuclear steam supply system components and containment internal structures.

Table B.3 Mark II Steel Containments

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B2.1.CP-46	3.5-1, 035	Steel elements (accessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B2.1.CP-114	3.5-1, 041	Steel elements (inaccessible areas): support skirt	Steel	Concrete	None	None	No
-	II.B2.1.CP-63	3.5-1, 005	Steel elements (inaccessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B2.1.CP-117	3.5-1, 031	Steel elements: downcomer pipes	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.B2.1.C-23	3.5-1, 036	Steel elements: drywell head; downcomers	Steel	Air – indoor uncontrolled	Loss of material due to mechanical wear, including fretting	AMP XI.S1, "ASME Section XI, Subsection IWE"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B2.1.CP-107	3.5-1, 027	Suppression pool shell	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled, treated water	Cracking due to cyclic loading (current licensing basis [CLB] fatigue analysis does not exist)	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B2.1.C-45	3.5-1, 009	Suppression pool shell; unbraced downcomers	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled, treated water	Cumulative fatigue damage due to fatigue (Only if CLB fatigue analysis exists)	TLAA, SRP-SLR Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis"	Yes
M	II.B2.1.CP-142	3.5-1, 040	Unbraced downcomers	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled, treated water	Cracking due to cyclic loading (CLB fatigue analysis does not exist)	AMP XI.S1, "ASME Section XI, Subsection IWE"	Yes

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; CLB = current licensing basis; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan for Review of Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

1 **Table B.4 Mark II Concrete Containments**

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B2.2.CP-79	3.5-1, 021	Concrete (accessible areas): basemat; reinforcing steel	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B2.2.CP-59	3.5-1, 019	Concrete (accessible areas): containment; wall; basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B2.2.CP-54	3.5-1, 020	Concrete (accessible areas): containment; wall; basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B2.2.CP-80	3.5-1, 023	Concrete (inaccessible areas): basemat; reinforcing steel	Concrete	Any	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B2.2.CP-99	3.5-1, 012	Concrete (inaccessible areas): containment; wall; basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
M	II.B2.2.CP-110	3.5-1, 014	Concrete (inaccessible areas): containment; wall; basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	II.B2.2.CP-105	3.5-1, 001	Concrete elements: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B2.2.CP-57	3.5-1, 003	Concrete: containment; wall; basemat	Concrete	Air – indoor uncontrolled, air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	II.B2.2.CP-106	3.5-1, 016	Concrete: containment; wall; basemat	Concrete	Air – indoor uncontrolled, air – outdoor, groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No
-	II.B2.2.C-07	3.5-1, 002	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B2.2.C-11	3.5-1, 008	Prestressing system: tendons	Steel	Air – indoor uncontrolled, air – outdoor	Loss of prestress due to relaxation; shrinkage; creep; elevated temperature	TLAA, SRP-SLR Section 4.5, "Concrete Containment Tendon Prestress," and/or SRP-SLR Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses"	Yes
-	II.B2.2.C-10	3.5-1, 032	Prestressing system: tendons; anchorage components	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B2.2.CP-46	3.5-1, 035	Steel elements (accessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B2.2.CP-114	3.5-1, 041	Steel elements (inaccessible areas): support skirt	Steel	Concrete	None	None	No
-	II.B2.2.CP-63	3.5-1, 005	Steel elements (inaccessible areas): suppression chamber; drywell; drywell head; embedded shell; region shielded by diaphragm floor (as applicable)	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B2.2.CP-117	3.5-1, 031	Steel elements: downcomer pipes	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.B2.2.C-23	3.5-1, 036	Steel elements: drywell head; downcomers	Steel	Air – indoor uncontrolled	Loss of material due to mechanical wear, including fretting	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.B2.2.C-49	3.5-1, 037	Steel elements: suppression chamber (torus) liner (interior surface)	Steel; stainless steel	Air – indoor uncontrolled, treated water	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No
M	II.B2.2.CP-64	3.5-1, 040	Steel elements: vent header; downcomers	Steel; stainless steel	Air – indoor uncontrolled, treated water	Cracking due to cyclic loading (current licensing basis [CLB] fatigue analysis does not exist)	AMP XI.S1, "ASME Section XI, Subsection IWE"	Yes
n-	II.B2.2.C-48	3.5-1, 009	Steel elements: vent header; downcomers	Steel; stainless steel	Air – indoor uncontrolled, treated water	Cumulative fatigue damage due to fatigue (Only if CLB fatigue analysis exists)	TLAA, SRP-SLR Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis"	Yes

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; CLB = current licensing basis; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan for Review of Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

II MARK III CONTAINMENTS

B.5 STEEL CONTAINMENTS

B.6 CONCRETE CONTAINMENTS

B3 MARK III CONTAINMENTS

Systems, Structures, and Components

This section addresses the elements of boiling water reactor Mark III containment structures. Mark III steel containments are discussed in Table B.5. Mark III concrete containments are discussed in Table B.6.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation components (V.C), and the standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and the feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the nuclear steam supply system components and containment internal structures.

Table B.5 Mark III Steel Containments

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B3.1.CP-72	3.5-1, 016	Concrete (accessible areas): basemat	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.B3.1.CP-156	3.5-1, 020	Concrete (accessible areas): basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.B3.1.CP-66	3.5-1, 019	Concrete (accessible areas): basemat, concrete fill-in annulus	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.B3.1.CP-74	3.5-1, 021	Concrete (accessible areas): basemat; reinforcing steel	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No
-	II.B3.1.CP-71	3.5-1, 024	Concrete (inaccessible areas): basemat	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B3.1.CP-53	3.5-1, 014	Concrete (inaccessible areas): basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
M	II.B3.1.CP-83	3.5-1, 012	Concrete (inaccessible areas): basemat, concrete fill-in annulus	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
	II.B3.1.CP-75	3.5-1, 023	Concrete (inaccessible areas): basemat; reinforcing steel	Concrete	Any	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B3.1.CP-69	3.5-1, 001	Concrete: basemat	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S2, "ASME Section XI, Subsection IWL," or AMP XI.S6, "Structures Monitoring"	Yes
M	II.B3.1.CP-65	3.5-1, 003	Concrete: basemat, concrete fill-in annulus	Concrete	Air – indoor uncontrolled, air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	II.B3.1.C-07	3.5-1, 002	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B3.1.CP-43	3.5-1, 035	Steel elements (accessible areas): drywell shell; drywell head	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B3.1.CP-113	3.5-1, 004	Steel elements (inaccessible areas): drywell shell; drywell head	Steel	Air – indoor uncontrolled, concrete	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B3.1.C-24	3.5-1, 038	Steel elements: suppression chamber shell (interior surface)	Stainless steel	Air – indoor uncontrolled	Cracking due to stress corrosion cracking	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B3.1.CP-158	3.5-1, 007	Steel elements: suppression chamber shell (interior surface)	Steel	Air – indoor uncontrolled, treated water	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE"	Yes

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

Table B.6 Mark III Concrete Containments

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B3.2.CP-84	3.5-1, 024	Concrete (accessible areas): dome; wall; basemat	Concrete	Air – indoor uncontrolled, air – outdoor, groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No
-	II.B3.2.CP-52	3.5-1, 018	Concrete (accessible areas): dome; wall; basemat	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B3.2.CP-60	3.5-1, 019	Concrete (accessible areas): dome; wall; basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B3.2.CP-55	3.5-1, 020	Concrete (accessible areas): dome; wall; basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S2, "ASME Section XI, Subsection IWL"	No
-	II.B3.2.CP-88	3.5-1, 021	Concrete (accessible areas): dome; wall; basemat; reinforcing steel	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B3.2.CP-73	3.5-1, 024	Concrete (inaccessible areas): dome; wall; basemat	Concrete	Air – indoor uncontrolled, air – outdoor, groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No
M	II.B3.2.CP-135	3.5-1, 011	Concrete (inaccessible areas): dome; wall; basemat	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions, or AMP XI.S2, "ASME Section XI, Subsection IWL ", and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B3.2.CP-121	3.5-1, 012	Concrete (inaccessible areas): dome; wall; basemat	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program significant if it is demonstrated that the in-place concrete can perform its intended function, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary.	Yes
M	II.B3.2.CP-122	3.5-1, 014	Concrete (inaccessible areas): dome; wall; basemat	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program, or AMP XI.S2, "ASME Section XI, Subsection IWL," and/or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B3.2.CP-89	3.5-1, 023	Concrete (inaccessible areas): dome; wall; basemat; reinforcing steel	Concrete	Any	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	No
-	II.B3.2.CP-105	3.5-1, 001	Concrete elements: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S2, "ASME Section XI, Subsection IWL," and supplemented, as necessary, by AMP XI.S6, "Structures Monitoring"	Yes
M	II.B3.2.CP-108	3.5-1, 003	Concrete: dome; wall; basemat	Concrete	Air – indoor uncontrolled, air – outdoor	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded, or AMP XI.S2, “ASME Section XI, Subsection IWL,” and/or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B3.2.C-07	3.5-1, 002	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	II.B3.2.CP-35	3.5-1, 035	Steel elements (accessible areas): liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B3.2.CP-98	3.5-1, 005	Steel elements (inaccessible areas): liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B3.2.C-24	3.5-1, 038	Steel elements: suppression chamber shell (interior surface)	Stainless steel	Air – indoor uncontrolled	Cracking due to stress corrosion cracking	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

B4 COMMON COMPONENTS

Systems, Structures, and Components

This section addresses the common components of boiling water reactor containments. The common components include (1) penetration sleeves and bellows, (2) dissimilar metal welds, (3) personnel airlock, (4) equipment hatch, (5) control rod drive and hatch, (6) seals, (7) gaskets, and (8) moisture barriers.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation components (V.C), and standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and the feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the nuclear steam supply system components and containment internal structures.

Table B.7 Common Components

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	II.B4.CP-37	3.5-1, 027	Metal liner, metal plate, airlock, equipment hatch, control rod drive (CRD) hatch; penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Cracking due to cyclic loading (current licensing basis [CLB] fatigue analysis does not exist)	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B4.C-13	3.5-1, 009	Metal liner, metal plate, personnel airlock, equipment hatch, CRD hatch, penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Cumulative fatigue damage due to fatigue (Only if CLB fatigue analysis exists)	TLAA, SRP-SLR Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis"	Yes
-	II.B4.CP-40	3.5-1, 026	Moisture barriers (caulking, flashing, other sealants)	Elastomer, rubber and other similar materials	Air – indoor uncontrolled	Loss of sealing due to wear, damage, erosion, tear, surface cracks, other defects	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.B4.CP-36	3.5-1, 035	Penetration sleeves	Steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B4.CP-38	3.5-1, 010	Penetration sleeves; penetration bellows	Stainless steel; dissimilar metal welds	Air – indoor uncontrolled, air – outdoor	Cracking due to stress corrosion cracking	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	Yes
-	II.B4.C-16	3.5-1, 028	Personnel airlock, equipment hatch, CRD hatch	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	II.B4.CP-39	3.5-1, 029	Personnel airlock, equipment hatch, CRD hatch: locks, hinges, closure mechanisms	Steel	Air – indoor uncontrolled, air – outdoor	Loss of leak tightness due to mechanical wear	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No
-	II.B4.CP-148	3.5-1, 031	Pressure-retaining bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S1, "ASME Section XI, Subsection IWE"	No
-	II.B4.CP-150	3.5-1, 030	Pressure-retaining bolting	Steel	Any	Loss of preload due to self-loosening	AMP XI.S1, "ASME Section XI, Subsection IWE," and AMP XI.S4, "10 CFR Part 50, Appendix J"	No
-	II.B4.CP-41	3.5-1, 033	Seals and gaskets	Elastomer, rubber and other similar materials	Air – indoor uncontrolled, air – outdoor	Loss of sealing due to wear, damage, erosion, tear, surface cracks, other defects	AMP XI.S4, "10 CFR Part 50, Appendix J"	No
-	II.B4.CP-152	3.5-1, 034	Service Level I coatings	Coatings	Air – indoor uncontrolled, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage	AMP XI.S8, "Protective Coating Monitoring and Maintenance"	No

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; CLB = current licensing basis; CRD = control rod drive; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan for Review of Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

CHAPTER III

STRUCTURES AND COMPONENT SUPPORTS

III STRUCTURES AND COMPONENT SUPPORTS

III A. SAFETY-RELATED AND OTHER STRUCTURES

Safety-related structures are those defined pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 54.4(a)(1), and the other structures are those defined pursuant to 10 CFR 54.4(a)(2) and 10 CFR 54.4(a)(3). Structures in this section are organized into nine groups and are discussed separately under subheadings A1 through A9.

III B. COMPONENT SUPPORTS

Component supports include supports for American Society of Mechanical Engineers (ASME) piping and components; supports for cable trays, conduit, heating, ventilation, and air conditioning (HVAC) ducts, TubeTrack®, instrument tubing, non-ASME piping and components; anchorage of racks, panels, cabinets, and enclosures for electrical equipment and instrumentation; supports for emergency diesel generator and HVAC system components; and supports for platforms, pipe whip restraints, jet impingement shields, masonry walls, and other miscellaneous structures.

III SAFETY-RELATED AND OTHER STRUCTURES

A1. GROUP 1 STRUCTURES (BWR REACTOR BLDG., PWR SHIELD BLDG., CONTROL ROOM/BLDG.)

A2. GROUP 2 STRUCTURES (BWR REACTOR BLDG. WITH STEEL SUPERSTRUCTURE)

A3. GROUP 3 STRUCTURES (AUXILIARY BLDG., DIESEL GENERATOR BLDG., RADWASTE BLDG., TURBINE BLDG., SWITCHGEAR ROOM, YARD STRUCTURES SUCH AS AFW PUMPHOUSE, UTILITY/PIPING TUNNELS, SECURITY/LIGHTING POLES, MANHOLES, DUCT BANKS; SBO STRUCTURES, SUCH AS TRANSMISSION TOWERS, STARTUP TOWERS CIRCUIT BREAKER FOUNDATION, ELECTRICAL ENCLOSURE)

A4. GROUP 4 STRUCTURES (CONTAINMENT INTERNAL STRUCTURES, EXCLUDING REFUELING CANAL)

A5. GROUP 5 STRUCTURES (FUEL STORAGE FACILITY, REFUELING CANAL)

A6. GROUP 6 STRUCTURES (WATER-CONTROL STRUCTURES)

A7. GROUP 7 STRUCTURES (CONCRETE TANKS AND MISSILE BARRIERS)

A8. GROUP 8 STRUCTURES (STEEL TANKS AND MISSILE BARRIERS)

A9. GROUP 9 STRUCTURES (BWR UNIT VENT STACK)

A SAFETY-RELATED AND OTHER STRUCTURES

A1 GROUP 1 STRUCTURES (BOILING WATER REACTOR BUILDING, PRESSURIZED WATER REACTOR SHIELD BUILDING, CONTROL ROOM/BUILDING)

Systems, Structures, and Components

This section addresses the elements of the boiling water reactor building, pressurized water reactor shield building, and control room/building. For this group, the applicable structural elements are concrete, steel, and masonry walls. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed systems or components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.1 Group 1 Structures (Boiling Water Reactor Bldg., Pressurized Water Reactor Shield Bldg., Control Room/Bldg.)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
	III.A1.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-27	3.5-1, 065	Concrete (accessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-23	3.5-1, 064	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-24	3.5-1, 063	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-26	3.5-1, 066	Concrete (accessible areas): interior and above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
M	III.A1.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
	III.A1.TP-212	3.5-1, 065	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-29	3.5-1, 067	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A1.TP-67	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
M	III.A1.TP-108	3.5-1, 042	Concrete (inaccessible areas): foundation	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A1.TP-114	3.5-1, 048	Concrete: all	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
	III.A1.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes
	III.A1.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
	III.A1.TP-28	3.5-1, 067	Concrete: interior; above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
	III.A1.T-12	3.5-1, 070	Masonry walls: all	Concrete block	Air – indoor uncontrolled, air – outdoor	Cracking due to restraint shrinkage, creep, and aggressive environment	AMP XI.S5, "Masonry Walls"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
	III.A1.TP-34	3.5-1, 071	Masonry walls: all	Concrete block	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S5, "Masonry Walls"	No
	III.A1.TP-302	3.5-1, 077	Steel components: all structural steel	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
	III.A1.TP-300							

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A2 GROUP 2 STRUCTURES (BOILING WATER REACTOR BUILDING WITH STEEL SUPERSTRUCTURE)

Systems, Structures, and Components

This section addresses the elements of the boiling water reactor building with a steel superstructure. For this group, the applicable structural elements are (1) concrete, (2) steel, and (3) masonry walls. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed systems and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.2 Group 2 Structures (Boiling Water Reactor Bldg. with a Steel Superstructure)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A2.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.TP-27	3.5-1, 065	Concrete (accessible areas): below-grade exterior; foundation	Concrete	Groundwater/ soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.TP-23	3.5-1, 064	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.TP-24	3.5-1, 063	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.TP-26	3.5-1, 066	Concrete (accessible areas): interior and above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A2.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A2.TP-212	3.5-1, 065	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/ soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.TP-29	3.5-1, 067	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/ soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A2.TP-67	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A2.TP-108	3.5-1, 042	Concrete (inaccessible areas): foundation	Concrete	Air – outdoor, groundwater/ soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
M	III.A2.TP-114	3.5-1, 048	Concrete: all	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A2.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A2.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A2.TP-28	3.5-1, 067	Concrete: interior; above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.T-12	3.5-1, 070	Masonry walls: all	Concrete block	Air – indoor uncontrolled, air – outdoor	Cracking due to restraint shrinkage, creep, and aggressive environment	AMP XI.S5, "Masonry Walls"	No
-	III.A2.TP-34	3.5-1, 071	Masonry walls: all	Concrete block	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S5, "Masonry Walls"	No
-	III.A2.TP-302	3.5-1, 077	Steel components: all structural steel	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.A2.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A2.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
D	III.A2.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A3 GROUP 3 STRUCTURES (AUXILIARY BUILDING; DIESEL GENERATOR BUILDING; RADWASTE BUILDING; TURBINE BUILDING; SWITCHGEAR ROOM; YARD STRUCTURES, SUCH AS AUXILIARY FEEDWATER PUMPHOUSE, UTILITY/PIPING TUNNELS, SECURITY/LIGHTING POLES, MANHOLES, AND DUCT BANKS; AND STATION BLACKOUT STRUCTURES, SUCH AS TRANSMISSION TOWERS, STARTUP TOWERS CIRCUIT BREAKER FOUNDATION, AND ELECTRICAL ENCLOSURE)

Systems, Structures, and Components

This section addresses the elements of the auxiliary building, diesel generator building, radwaste building, turbine building, switchgear room, yard structures, and station blackout structures. For this group, the applicable structural elements are (1) concrete, (2) steel, and (3) masonry walls. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed structures and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.3 Group 3 Structures (Auxiliary Bldg., Diesel Generator Bldg., Radwaste Bldg., Turbine Bldg., Switchgear Rm., Yard Structures Such as Auxiliary Feedwater Pumphouse, Utility/Piping Tunnels, Security/Lighting Poles, Manholes, Duct Banks; Station Blackout Structures Such as Transmission Towers, Startup Tower Circuit Breaker Foundation, Electrical Enclosure)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A3.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.TP-27	3.5-1, 065	Concrete (accessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.TP-23	3.5-1, 064	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.TP-24	3.5-1, 063	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No
	III.A3.TP-26	3.5-1, 066	Concrete (accessible areas): interior and above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A3.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
-	III.A3.TP-212	3.5-1, 065	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.TP-29	3.5-1, 067	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A3.TP-67	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A3.TP-108	3.5-1, 042	Concrete (inaccessible areas): foundation	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
M	III.A3.TP-114	3.5-1, 048	Concrete: all	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A3.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A3.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A3.TP-28	3.5-1, 067	Concrete: interior; above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.T-12	3.5-1, 070	Masonry walls: all	Concrete block	Air – indoor uncontrolled, air – outdoor	Cracking due to restraint shrinkage, creep, and aggressive environment	AMP XI.S5, "Masonry Walls"	No
-	III.A3.TP-34	3.5-1, 071	Masonry walls: all	Concrete block	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S5, "Masonry Walls"	No
-	III.A3.TP-302	3.5-1, 077	Steel components: all structural steel	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.TP-219	3.5-1, 079	Steel components: piles	Steel	Soil, groundwater	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.A3.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A3.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
D	III.A3.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A4 GROUP 4 STRUCTURES (CONTAINMENT INTERNAL STRUCTURES, EXCLUDING THE REFUELING CANAL)

Systems, Structures, and Components

This section addresses the elements of the containment internal structures, excluding the refueling canal. For this group, the applicable structural elements are (1) concrete and (2) steel elements. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed systems and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.4 Group Structures (Containment Internal Structures, Excluding the Refueling Canal)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A4.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
-	III.A4.TP-26	3.5-1, 066	Concrete (accessible areas): interior and above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
M	III.A4.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
M	III.A4.TP-305	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A4.TP-114	3.5-1, 048	Concrete: all	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A4.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A4.TP-28	3.5-1, 067	Concrete: interior; above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A4.T-35	3.5-1, 097	Group 4: Concrete (reactor cavity area proximate to the reactor vessel): reactor (primary/biological) shield wall; sacrificial shield wall; reactor vessel support/pedestal structure	Concrete	Air – indoor uncontrolled	Reduction of strength; loss of mechanical properties due to irradiation (i.e., radiation interactions with material and radiation-induced heating)	Plant-specific aging management program, or other selected AMPs, enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A4.TP-301	3.5-1, 073	Service Level I coatings	Coatings	Air – indoor uncontrolled, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage	AMP XI.S8, "Protective Coating Monitoring and Maintenance"	No
-	III.A4.TP-35	3.5-1, 076	Sliding surfaces: radial beam seats in boiling water reactor drywell	Lubrite®; Fluorogold; Lubrofluor	Air – indoor uncontrolled	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S6, "Structures Monitoring"	No
-	III.A4.TP-302	3.5-1, 077	Steel components: all structural steel	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A4.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.A4.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A4.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	III.A4.T-36	3.5-1, 102	Reactor vessel steel structural supports, support skirt structures, their assembled steel components (reactor cavity area in the proximity of the reactor vessel)	Steel	Air – indoor uncontrolled	Reduction in fracture toughness, loss of intended function due to irradiation	Plant-specific aging management program or plant-specific enhancements to selected GALL-SLR AMPs (e.g., AMP XI.S3, "ASME Section XI, Subsection IWF," and/or AMP XI.S6, "Structures Monitoring")	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	III.A4.T-37	3.5-1, 102	Reactor vessel steel structural supports, support skirt structures, their assembled steel components (reactor cavity area in the proximity of the reactor vessel)	Steel	Air – indoor uncontrolled	Reduction in fracture toughness, loss of intended function due to irradiation	Plant-specific aging management program or plant-specific enhancements to selected GALL-SLR AMPs (e.g., AMP XI.S3, “ASME Section XI, Subsection IWF," and/or AMP XI.S6, “Structures Monitoring,” and if/when necessary*, AMP XI.M1 “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD”) * if/when there is evidence of combined aging effects in areas of high tensile stresses	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	III.A4.TP-37	3.5-1, 103	Reactor vessel support sliding feet surfaces, other special components (e.g., special coating)	Lubrite®; graphitic material; or other similar materials; special coatings	Air – indoor uncontrolled	Loss of intended function (mechanical) due to irradiation	Plant-specific aging management program or plant-specific enhancements to selected GALL-SLR AMPs (e.g., XI.S3 or XI.S6)	Yes
D	III.A4.TP-300	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; GALL-SLR = Generic Aging Lessons Learned for Subsequent License Renewal; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A5 GROUP 5 STRUCTURES (FUEL STORAGE FACILITY, REFUELING CANAL)

Systems, Structures, and Components

This section addresses the elements of the fuel storage facility and refueling canal. For this group, the applicable structural elements are (1) concrete, (2) steel, and (3) masonry walls. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed structures and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.5 Group 5 Structures (Fuel Storage Facility, Refueling Canal)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A5.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.TP-27	3.5-1, 065	Concrete (accessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.TP-23	3.5-1, 064	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.TP-24	3.5-1, 063	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.TP-26	3.5-1, 066	Concrete (accessible areas): interior and above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A5.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
-	III.A5.TP-212	3.5-1, 065	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.TP-29	3.5-1, 067	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A5.TP-67	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A5.TP-108	3.5-1, 042	Concrete (inaccessible areas): foundation	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
M	III.A5.TP-114	3.5-1, 048	Concrete: all	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus due to elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program to be evaluated if temperature limits exceeded or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A5.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A5.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A5.TP-28	3.5-1, 067	Concrete: interior; above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.T-12	3.5-1, 070	Masonry walls: all	Concrete block	Air – indoor uncontrolled, air – outdoor	Cracking due to restraint shrinkage, creep, and aggressive environment	AMP XI.S5, "Masonry Walls"	No
-	III.A5.TP-34	3.5-1, 071	Masonry walls: all	Concrete block	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S5, "Masonry Walls"	No
-	III.A5.T-14	3.5-1, 078	Stainless steel fuel pool liner	Stainless steel	Treated water, treated borated water	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	AMP XI.M2, "Water Chemistry," and monitoring of the spent fuel pool water level and leakage from the leak chase channels.	No
-	III.A5.TP-302	3.5-1, 077	Steel components: all structural steel	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A5.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A5.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
D	III.A5.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A6 GROUP 6 STRUCTURES (WATER-CONTROL STRUCTURES)

Systems, Structures, and Components

This section addresses the elements of water-control structures. For this group, the applicable structural elements are (1) concrete, (2) steel, (3) masonry walls, and (4) earthen water-control structures (e.g., dams, embankments, reservoirs). The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed structures and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

1 **Table A.6 Group 6 Structures (Water-Control Structures)**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A6.T-34	3.5-1, 096	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants"	No
-	III.A6.TP-38	3.5-1, 059	Concrete (accessible areas): all	Concrete	Any	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the Federal Energy Regulatory Commission (FERC)/U.S. Army Corp of Engineers dam inspections and maintenance programs.	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A6.TP-36	3.5-1, 060	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Any	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / U.S. Army Corp of Engineers dam inspections and maintenance programs.	No
-	III.A6.TP-37	3.5-1, 061	Concrete (accessible areas): exterior above- and below-grade; foundation; interior slab	Concrete	Any	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/U.S. Army Corp of Engineers dam inspections and maintenance programs.	No
-	III.A6.TP-104	3.5-1, 065	Concrete (inaccessible areas): all	Concrete	Air – indoor uncontrolled, air – outdoor, groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A6.TP-220	3.5-1, 050	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A6.TP-107	3.5-1, 067	Concrete (inaccessible areas): all	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A6.TP-110	3.5-1, 049	Concrete (inaccessible areas): exterior above- and below-grade; foundation; interior slab	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A6.TP-109	3.5-1, 051	Concrete (inaccessible areas): exterior above- and below-grade; foundation; interior slab	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A6.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A6.T-20	3.5-1, 056	Concrete: exterior above- and below-grade; foundation; interior slab	Concrete	Water – flowing	Loss of material due to abrasion; cavitation	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/ U.S. Army Corp of Engineers dam inspections and maintenance programs.	No
-	III.A6.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A6.T-22	3.5-1, 058	Earthen water-control structures: dams; embankments; reservoirs; channels; canals; ponds	Various	Air – outdoor, water – flowing or standing	Loss of material; loss of form due to erosion, settlement, sedimentation, frost action, waves, currents, surface runoff, seepage	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/U.S. Army Corp of Engineers dam inspections and maintenance programs.	No
-	III.A6.TP-223	3.5-1, 062	Group 6: Wooden Piles; sheeting	Wood	Air – outdoor, water – flowing or standing, groundwater/soil	Loss of material; change in material properties due to weathering, chemical degradation, and insect infestation repeated wetting and drying, fungal decay	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / U.S. Army Corp of Engineers dam inspections and maintenance programs.	No
-	III.A6.T-12	3.5-1, 070	Masonry walls: all	Concrete block	Air – indoor uncontrolled, air – outdoor	Cracking due to restraint shrinkage, creep, and aggressive environment	AMP XI.S5, "Masonry Walls"	No
--	III.A6.TP-34	3.5-1, 071	Masonry walls: all	Concrete block	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S5, "Masonry Walls"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
	III.A6.TP-7	3.5-1, 072	Seals; gaskets; moisture barriers (caulking, flashing, and other sealants)	Elastomer, rubber and other similar materials	Any	Loss of sealing due to wear, damage, erosion, tear, surface cracks, other defects	AMP XI.S6, "Structures Monitoring"	No
-	III.A6.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.A6.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A6.TP-221	3.5-1, 083	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor, water – flowing or standing	Loss of material due to general, pitting, crevice corrosion	AMP XI.S7, "Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/ U.S. Army Corp of Engineers dam inspections and maintenance programs.	No
D	III.A6.TP-25	-	-	-	-	-	-	-

AMP = aging management program; FERC = Federal Energy Regulatory Commission; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A7 GROUP 7 STRUCTURES (CONCRETE TANKS AND MISSILE BARRIERS)

Systems, Structures, and Components

This section addresses the elements of concrete tanks and missile barriers. For this group, the applicable structural elements are (1) concrete and (2) steel. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed structures and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.7 Group 7 Structures (Concrete Tanks and Missile Barriers)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A7.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.TP-27	3.5-1, 065	Concrete (accessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.TP-23	3.5-1, 064	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.TP-24	3.5-1, 063	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.TP-26	3.5-1, 066	Concrete (accessible areas): interior and above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A7.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
-	III.A7.TP-212	3.5-1, 065	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.TP-29	3.5-1, 067	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A7.TP-67	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A7.TP-108	3.5-1, 042	Concrete (inaccessible areas): foundation	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A7.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A7.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A7.TP-28	3.5-1, 067	Concrete: interior; above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A7.TP-302	3.5-1, 077	Steel components: all structural steel	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.T-23	3.5-1, 052	Steel components: tank liner	Stainless steel	Water – standing	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Plant-specific aging management program	Yes
-	III.A7.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A7.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
D	III.A7.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A8 GROUP 8 STRUCTURES (STEEL TANKS AND MISSILE BARRIERS)

Systems, Structures, and Components

This section addresses the elements of steel tanks and missile barriers. For this group, the applicable structural elements are (1) concrete and (2) steel. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed structures and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.8 Group 8 Structures (Steel Tanks and Missile Barriers)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A8.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
-	III.A8.TP-27	3.5-1, 065	Concrete (accessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A8.TP-23	3.5-1, 064	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S6, "Structures Monitoring"	No
-	III.A8.TP-24	3.5-1, 063	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No
M	III.A8.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A8.TP-212	3.5-1, 065	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A8.TP-29	3.5-1, 067	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A8.TP-67	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
M	III.A8.TP-108	3.5-1, 042	Concrete (inaccessible areas): foundation	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A8.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A8.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction of foundation strength and cracking due to differential settlement and erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A8.TP-302	3.5-1, 077	Steel components: all structural steel	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A8.T-23	3.5-1, 052	Steel components: tank liner	Stainless steel	Water – standing	Cracking due to stress corrosion cracking ; loss of material due to pitting and crevice corrosion	Plant-specific aging management program	Yes
-	III.A8.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.A8.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A8.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
D	III.A8.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A9 GROUP 9 STRUCTURES (BOILING WATER REACTOR UNIT VENT STACK)

Systems, Structures, and Components

This section addresses the elements of the boiling water reactor unit vent stack. For this group, the applicable structural element is concrete. The aging management review is presented for each applicable combination of structural element and aging effect.

System Interfaces

Physical interfaces exist with any system or component that either penetrates the structure wall or is supported by the structure wall, floor, and roof. The direct interface is through the system or component supports that are anchored to the structure. Structures also protect housed structures and components from internal and external design basis events. In the case of tanks, there is a functional interface with the associated system. Water-control structures are integral parts of the systems that provide plant cooling water and residual heat removal.

Table A.9 Group 9 Structures (Boiling Water Reactor Unit Vent Stack)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan) SRP Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A9.TP-25	3.5-1, 054	Concrete (accessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	AMP XI.S6, "Structures Monitoring"	No
-	III.A9.TP-27	3.5-1, 065	Concrete (accessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A9.TP-23	3.5-1, 064	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.S6, "Structures Monitoring"	No
-	III.A9.TP-24	3.5-1, 063	Concrete (accessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	AMP XI.S6, "Structures Monitoring"	No
-	III.A9.TP-26	3.5-1, 066	Concrete (accessible areas): interior and above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan) SRP Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A9.TP-204	3.5-1, 043	Concrete (inaccessible areas): all	Concrete	Any	Cracking due to expansion from reaction with aggregates	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
-	III.A9.TP-212	3.5-1, 065	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Cracking; loss of bond; and loss of material (spalling, scaling) due to corrosion of embedded steel	AMP XI.S6, "Structures Monitoring"	No
-	III.A9.TP-29	3.5-1, 067	Concrete (inaccessible areas): below-grade exterior; foundation	Concrete	Groundwater/soil	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
M	III.A9.TP-67	3.5-1, 047	Concrete (inaccessible areas): exterior above- and below-grade; foundation	Concrete	Water – flowing	Increase in porosity and permeability; loss of strength due to leaching of calcium hydroxide and carbonation	Plant-specific aging management program or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan) SRP Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	III.A9.TP-108	3.5-1, 042	Concrete (inaccessible areas): foundation	Concrete	Air – outdoor, groundwater/soil	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Plant-specific aging management program to be evaluated for plants in moderate to severe weathering conditions or AMP XI.S6, “Structures Monitoring,” enhanced as necessary	Yes
-	III.A9.TP-30	3.5-1, 044	Concrete: all	Concrete	Soil	Cracking and distortion due to increased stress levels from settlement	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A9.TP-31	3.5-1, 046	Concrete: foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction in foundation strength, cracking due to differential settlement, erosion of porous concrete subfoundation	AMP XI.S6, "Structures Monitoring"	Yes
-	III.A9.TP-28	3.5-1, 067	Concrete: interior; above-grade exterior	Concrete	Air – indoor uncontrolled, air – outdoor	Increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack	AMP XI.S6, "Structures Monitoring"	No
-	III.A9.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan) SRP Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.A9.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.A9.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
D	III.A9.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

III COMPONENT SUPPORTS

B1. SUPPORTS FOR ASME PIPING AND COMPONENTS

B2. SUPPORTS FOR CABLE TRAYS, CONDUIT, HVAC DUCTS, TUBETRACK®, INSTRUMENT TUBING, NON-ASME PIPING AND COMPONENTS

B3. ANCHORAGE OF RACKS, PANELS, CABINETS, AND ENCLOSURES FOR ELECTRICAL EQUIPMENT AND INSTRUMENTATION

B4. SUPPORTS FOR EMERGENCY DIESEL GENERATOR (EDG), HVAC SYSTEM COMPONENTS, AND OTHER MISCELLANEOUS MECHANICAL EQUIPMENT

B5. SUPPORTS FOR PLATFORMS, PIPE WHIP RESTRAINTS, JET IMPINGEMENT SHIELDS, MASONRY WALLS, AND OTHER MISCELLANEOUS STRUCTURES

B COMPONENT SUPPORTS

Component supports include supports for ASME piping and components; supports for cable trays, conduit, HVAC ducts, TubeTrack®, instrument tubing, and non-ASME piping and components; anchorage of racks, panels, cabinets, and enclosures for electrical equipment and instrumentation; supports for emergency diesel generator and HVAC system components; and supports for platforms, pipe whip restraints, jet impingement shields, masonry walls, and other miscellaneous structures.

B1 SUPPORTS FOR ASME PIPING AND COMPONENTS

Systems, Structures, and Components

This section addresses supports and anchorage for ASME Boiler and Pressure Vessel Code (ASME Code) piping systems and components. It is subdivided into Class 1 (Table B.1), Class 2 and Class 3 (Table B.2), and Class MC (III.B1.3). Applicable aging effects are identified and the aging management review is presented for each applicable combination of support component and aging effect.

System Interfaces

Physical interfaces exist with the structure, system, or component being supported and with the building structural element to which the support is anchored. A primary function of supports is to provide anchorage of the supported element for internal and external design basis events so that the supported element can perform its intended function.

Table B.1 Class 1

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.1.TP-42	3.5-1, 055	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Concrete; grout	Air – indoor uncontrolled, air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	AMP XI.S6, "Structures Monitoring"	No
-	III.B1.1.T-28	3.5-1, 057	Constant and variable load spring hangers; guides; stops	Steel	Air – indoor uncontrolled, air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.1.TP-41	3.5-1, 068	High-strength structural bolting	High-strength steel	Air	Cracking due to stress corrosion cracking (SCC)	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.1.TP-45	3.5-1, 075	Sliding surfaces	Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor	Air – indoor uncontrolled, air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.1.TP-229	3.5-1, 087	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S3, "ASME Section XI, Subsection IWF"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.1.TP-232	3.5-1, 085	Structural bolting	Stainless steel	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.1.TP-226	3.5-1, 081	Structural Bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.1.TP-235	3.5-1, 086	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.1.T-36a	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	III.B1.1.T-36b	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.S3, "ASME Section XI, Subsection IWF"	Yes
-	III.B1.1.T-36c	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	III.B1.1.TP-8	3.5-1, 095	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.1.TP-3	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B1.1.TP-4	3.5-1, 098	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel, aluminum alloy	Air with borated water leakage	None	None	No
-	III.B1.1.T-26	3.5-1, 053	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled	Cumulative fatigue damage due to cyclic loading (only if current licensing basis fatigue analysis exists)	TLAA, SRP-SLR Section 4.3 "Metal Fatigue," and/or Section 4.7 "Other Plant-Specific Time-Limited Aging Analyses"	Yes
-	III.B1.1.T-24	3.5-1, 091	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.1.T-25	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B1.1.TP-10	3.5-1, 090	Support members; welds; bolted connections; support anchorage to building structure	Steel; stainless steel	Treated water	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.S3, "ASME Section XI, Subsection IWF"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.1.T-33	3.5-1, 094	Vibration isolation elements	Non-metallic (e.g., rubber)	Air – indoor uncontrolled, air – outdoor	Reduction or loss of isolation function due to radiation hardening, temperature, humidity, sustained vibratory loading	AMP XI.S3, "ASME Section XI, Subsection IWF"	No

AMP = aging management program; ASME = American Society of Mechanical Engineers; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

1 **Table B.2 Class 2 and Class 3**

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.2.TP-42	3.5-1, 055	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Concrete; grout	Air – indoor uncontrolled, air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	AMP XI.S6, "Structures Monitoring"	No
-	III.B1.2.T-28	3.5-1, 057	Constant and variable load spring hangers; guides; stops	Steel	Air – indoor uncontrolled, air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.2.TP-45	3.5-1, 075	Sliding surfaces	Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor	Air – indoor uncontrolled, air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.2.TP-229	3.5-1, 087	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.2.TP-232	3.5-1, 085	Structural bolting	Stainless steel	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.2.TP-226	3.5-1, 081	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.2.TP-235	3.5-1, 086	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.2.T-36a	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	III.B1.2.T-36b	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.S3, "ASME Section XI, Subsection IWF"	Yes
-	III.B1.2.T-36c	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	III.B1.2.TP-8	3.5-1, 095	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No
-	III.B1.2.TP-3	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B1.2.TP-4	3.5-1, 098	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel, aluminum alloy	Air with borated water leakage	None	None	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.2.T-26	3.5-1, 053	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled	Cumulative fatigue damage due to cyclic loading (Only if current licensing basis fatigue analysis exists)	TLAA, SRP-SLR Section 4.3 "Metal Fatigue," and/or Section 4.7 "Other Plant-Specific Time-Limited Aging Analyses"	Yes
-	III.B1.2.T-24	3.5-1, 091	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.2.T-25	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B1.2.T-33	3.5-1, 094	Vibration isolation elements	Non-metallic (e.g., rubber)	Air – indoor uncontrolled, air – outdoor	Reduction or loss of isolation function due to radiation hardening, temperature, humidity, sustained vibratory loading	AMP XI.S3, "ASME Section XI, Subsection IWF"	No

AMP = aging management program; ASME = American Society of Mechanical Engineers; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

1 **Table B.3 Class MC**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/ Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.3.TP-42	3.5-1, 055	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Concrete; grout	Air – indoor uncontrolled, air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	AMP XI.S6, "Structures Monitoring"	No
-	III.B1.3.T-28	3.5-1, 057	Constant and variable load spring hangers; guides; stops	Steel	Air – indoor uncontrolled, air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.3.TP-45	3.5-1, 075	Sliding surfaces	Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor	Air – indoor uncontrolled, air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.3.TP-229	3.5-1, 087	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.3.TP-232	3.5-1, 085	Structural bolting	Stainless steel	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.3.TP-226	3.5-1, 081	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/ Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.3.TP-235	3.5-1, 086	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.3.T-36a	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	III.B1.3.T-36b	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.S3, "ASME Section XI, Subsection IWF"	Yes
-	III.B1.3.T-36c	3.5-1, 099	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	III.B1.3.TP-8	3.5-1, 095	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No
-	III.B1.3.TP-3	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B1.3.TP-4	3.5-1, 098	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel, aluminum alloy	Air with borated water leakage	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/ Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B1.3.T-26	3.5-1, 053	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled	Cumulative fatigue damage due to cyclic loading (Only if current licensing basis fatigue analysis exists)	TLAA, SRP-SLR Section 4.3 "Metal Fatigue," and/or Section 4.7 "Other Plant-Specific Time-Limited Aging Analyses"	Yes
-	III.B1.3.T-24	3.5-1, 091	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting corrosion	AMP XI.S3, "ASME Section XI, Subsection IWF"	No
-	III.B1.3.T-33	3.5-1, 094	Vibration isolation elements	Non-metallic (e.g., rubber)	Air – indoor uncontrolled, air – outdoor	Reduction or loss of isolation function due to radiation hardening, temperature, humidity, sustained vibratory loading	AMP XI.S3, "ASME Section XI, Subsection IWF"	No

AMP = aging management program; ASME = American Society of Mechanical Engineers; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

B2 SUPPORTS FOR CABLE TRAYS, CONDUIT, HVAC DUCTS, TUBETRACK®, INSTRUMENT TUBING, NON-ASME PIPING AND COMPONENTS

Systems, Structures, and Components

This section addresses supports and anchorage for cable trays, conduit, heating, ventilation, and air-conditioning ducts, TubeTrack®, instrument tubing, and non-American Society of Mechanical Engineers Boiler and Pressure Vessel Code piping and components. Applicable aging effects are identified and the aging management review is presented for each applicable combination of support component and aging effect.

System Interfaces

Physical interfaces exist with the structure, system, or component being supported and with the building structural element to which the support is anchored. A primary function of supports is to provide anchorage of the supported element for internal and external design basis events so that the supported element can perform its intended function.

Table B.4 Support for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B2.TP-42	3.5-1, 055	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Concrete; grout	Air – indoor uncontrolled, air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/service-induced cracking or other concrete aging mechanisms	AMP XI.S6, "Structures Monitoring"	No
-	III.B2.TP-46	3.5-1, 074	Sliding support bearings; sliding support surfaces	Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor	Air – indoor uncontrolled	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S6, "Structures Monitoring"	No
-	III.B2.TP-47	3.5-1, 074	Sliding support bearings; sliding support surfaces	Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor	Air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S6, "Structures Monitoring"	No
-	III.B2.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.B2.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B2.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B2.T-37a	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	III.B2.T-37b	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.S6, "Structures Monitoring"	Yes
-	III.B2.T-37c	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	III.B2.TP-8	3.5-1, 095	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No
-	III.B2.TP-6	3.5-1, 093	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – outdoor	Loss of material due to pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B2.TP-3	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B2.TP-4	3.5-1, 098	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel, aluminum alloy	Air with borated water leakage	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B2.TP-43	3.5-1, 092	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B2.T-25	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
D	III.B2.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

B3 ANCHORAGE OF RACKS, PANELS, CABINETS, AND ENCLOSURES FOR ELECTRICAL EQUIPMENT AND INSTRUMENTATION

Systems, Structures, and Components

This section addresses supports and anchorage for racks, panels, cabinets, and enclosures for electrical equipment and instrumentation. Applicable aging effects are identified and the aging management review is presented for each applicable combination of support component and aging effect.

System Interfaces

Physical interfaces exist with the structure, system, or component being supported and with the building structural element to which the support is anchored. A primary function of supports is to provide anchorage of the supported element for internal and external design basis events so that the supported element can perform its intended function.

Table B.5 Anchorage of Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B3.TP-42	3.5-1, 055	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Concrete; grout	Air – indoor uncontrolled, air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	AMP XI.S6, "Structures Monitoring"	No
-	III.B3.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.B3.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B3.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B3.T-37a	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	III.B3.T-37b	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.S6, "Structures Monitoring"	Yes
-	III.B3.T-37c	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B3.TP-8	3.5-1, 095	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No
-	III.B3.TP-3	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B3.TP-4	3.5-1, 098	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel, aluminum alloy	Air with borated water leakage	None	None	No
-	III.B3.TP-43	3.5-1, 092	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B3.T-25	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
D	III.B3.TP-300	-	-	-	-	n-	-	-

AMP = aging management program; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

B4 SUPPORTS FOR EMERGENCY DIESEL GENERATOR, HEATING, VENTILATION, AND AIR CONDITIONING SYSTEM COMPONENTS, AND OTHER MISCELLANEOUS MECHANICAL EQUIPMENT

Systems, Structures, and Components

This section addresses supports and anchorage for the emergency diesel generator and heating, ventilation, and air conditioning system components, and other miscellaneous mechanical equipment. Applicable aging effects are identified and the aging management review is presented for each applicable combination of support component and aging effect.

System Interfaces

Physical interfaces exist with the structure, system, or component being supported and with the building structural element to which the support is anchored. A primary function of supports is to provide anchorage of the supported element for internal and external design basis events so that the supported element can perform its intended function.

Table B.6 Supports for Emergency Diesel Generator, HVAC System Components, and Other Miscellaneous Mechanical Equipment

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B4.TP-42	3.5-1, 055	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Concrete; grout	Air – indoor uncontrolled, air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	AMP XI.S6, "Structures Monitoring"	No
-	III.B4.TP-46	3.5-1, 074	Sliding support bearings; sliding support surfaces	Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor	Air – indoor uncontrolled	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S6, "Structures Monitoring"	No
-	III.B4.TP-47	3.5-1, 074	Sliding support bearings; sliding support surfaces	Lubrite®; graphitic tool steel; Fluorogold; Lubrofluor	Air – outdoor	Loss of mechanical function due to corrosion, distortion, dirt or debris accumulation, overload, wear	AMP XI.S6, "Structures Monitoring"	No
-	III.B4.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.B4.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B4.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B4.T-37a	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	III.B4.T-37b	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.S6, "Structures Monitoring"	Yes
-	III.B4.T-37c	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	III.B4.TP-8	3.5-1, 095	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No
-	III.B4.TP-6	3.5-1, 093	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – outdoor	Loss of material due to pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B4.TP-3	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B4.TP-4	3.5-1, 098	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel, aluminum alloy	Air with borated water leakage	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B4.TP-43	3.5-1, 092	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B4.T-25	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B4.TP-44	3.5-1, 094	Vibration isolation elements	Non-metallic (e.g., rubber)	Air – indoor uncontrolled, air – outdoor	Reduction or loss of isolation function due to radiation hardening, temperature, humidity, sustained vibratory loading	AMP XI.S6, "Structures Monitoring"	No
D	III.B4.TP-300	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

B5 SUPPORTS FOR PLATFORMS, PIPE WHIP RESTRAINTS, JET IMPINGEMENT SHIELDS, MASONRY WALLS, AND OTHER MISCELLANEOUS STRUCTURES

Systems, Structures, and Components

This section addresses supports and anchorage for platforms, pipe whip restraints, jet impingement shields, masonry walls, and other miscellaneous structures. Applicable aging effects are identified and the aging management review is presented for each applicable combination of support component and aging effect.

System Interfaces

Physical interfaces exist with the structure, system, or component being supported and with the building structural element to which the support is anchored. A primary function of supports is to provide anchorage of the supported element for internal and external design basis events so that the supported element can perform its intended function.

Table B.7 Supports for Platforms, Pipe Whip Restraints, Jet Impingement Shields, Masonry Walls, and Other Miscellaneous Structures

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B5.TP-42	3.5-1, 055	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Concrete; grout	Air – indoor uncontrolled, air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	AMP XI.S6, "Structures Monitoring"	No
-	III.B5.TP-261	3.5-1, 088	Structural bolting	Any	Any	Loss of preload due to self-loosening	AMP XI.S6, "Structures Monitoring"	No
-	III.B5.TP-248	3.5-1, 080	Structural bolting	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B5.TP-274	3.5-1, 082	Structural bolting	Steel; galvanized steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B5.T-37a	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	III.B5.T-37b	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.S6, "Structures Monitoring"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B5.T-37c	3.5-1, 100	Support members; welds; bolted connections; support anchorage to building structure	Aluminum, stainless steel	Air, condensation	Loss of material due to pitting and crevice corrosion, cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
N	III.B5.T-306	3.5-1, 101	Wooden Poles	Wood	Air - outdoor, groundwater/soil	Loss of material; change in material properties due to weathering, chemical degradation, insect infestation repeated wetting and drying, fungal decay	Plant-specific aging management program, or AMP XI.S6, "Structures Monitoring," enhanced as necessary	Yes
-	III.B5.TP-8	3.5-1, 095	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No
-	III.B5.TP-3	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	III.B5.TP-4	3.5-1, 098	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel, aluminum alloy	Air with borated water leakage	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	III.B5.TP-43	3.5-1, 092	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting corrosion	AMP XI.S6, "Structures Monitoring"	No
-	III.B5.T-25	3.5-1, 089	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
D	III.B5.TP-300	-	-	-	-	-	-	-

AMP = aging management program; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

CHAPTER IV

REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

IV REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

A1. REACTOR VESSEL (BOILING WATER REACTOR)

A2. REACTOR VESSEL (PRESSURIZED WATER REACTOR)

B1. REACTOR VESSEL INTERNALS (BOILING WATER REACTOR)

B2. REACTOR VESSEL INTERNALS (PRESSURIZED WATER REACTOR)—WESTINGHOUSE

B3. REACTOR VESSEL INTERNALS (PRESSURIZED WATER REACTOR)—COMBUSTION ENGINEERING

B4. REACTOR VESSEL INTERNALS (PRESSURIZED WATER REACTOR)—BABCOCK AND WILCOX

C1. REACTOR COOLANT PRESSURE BOUNDARY (BOILING WATER REACTOR)

C2. REACTOR COOLANT SYSTEM AND CONNECTED LINES (PRESSURIZED WATER REACTOR)

D1. STEAM GENERATOR (RECIRCULATING)

D2. STEAM GENERATOR (ONCE-THROUGH)

E. COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

A REACTOR VESSEL

A1 REACTOR VESSEL (BOILING WATER REACTOR)

Systems, Structures, and Components

This section addresses the boiling water reactor (BWR) pressure vessel and consists of the vessel shell and flanges, attachment welds, top and bottom heads, nozzles (including safe ends) for the reactor coolant recirculating system and connected systems (such as high- and low-pressure core spray, high- and low-pressure coolant injection, main steam, and feedwater systems), penetrations for control rod drive stub tubes, instrumentation, standby liquid control (SLC), flux monitor, drain lines, and control rod drive mechanism housings. The support skirt and attachment welds for vessel supports are also included in the following table for the BWR vessel. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all structures and components that comprise the reactor vessel are governed by Group A Quality Standards.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the reactor vessel include the reactor vessel internals (IV.B1), the reactor coolant pressure boundary (IV.C1), the emergency core cooling system (V.D2), and the SLC system (VII.E2).

Table A.1 Reactor Vessel (BWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A1.R-448	3.1-1, 133	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	IV.A1.R-412	3.1-1, 097	Control rod drive return line nozzle cap and associated cap-to-nozzle weld or cap-to-safe end weld (BWR-3, BWR-4, BWR-5, and BWR-6 designs)	Stainless steel, nickel alloy	Reactor coolant	Cracking due to stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC)	AMP XI.M7, "BWR Stress Corrosion Cracking," and AMP XI.M2, "Water Chemistry"	No
-	IV.A1.R-450	3.1-1, 134	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	IV.A1.R-68	3.1-1, 128	Nozzle safe ends and welds: high-pressure core spray; low pressure core spray; recirculating water; low pressure coolant injection or residual heat removal injection mode	Stainless steel, nickel alloy	Reactor coolant	Cracking due to SCC, IGSCC	AMP XI.M7, "BWR Stress Corrosion Cracking," and AMP XI.M2, "Water Chemistry"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A1.R-65	3.1-1, 095	Nozzles: feedwater	Steel (with or without stainless steel or nickel alloy cladding)	Reactor coolant	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.A1.RP-369	3.1-1, 098	Penetrations: control rod drive stub tubes; in core monitor housings; jet pump instrument; standby liquid control; flux monitor	Stainless steel, nickel alloy	Reactor coolant	Cracking due to SCC, IGSCC, cyclic loading	AMP XI.M8, "BWR Penetrations," and AMP XI.M2, "Water Chemistry" (SCC, IGSCC mechanisms only)	No
-	IV.A1.RP-371	3.1-1, 030	Penetrations: drain line	Stainless steel, nickel alloy	Reactor coolant	Cracking due to SCC, IGSCC, cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry" (SCC, IGSCC mechanisms only)	No
-	IV.A1.R-70	3.1-1, 004	Pressure vessel support skirt and attachment welds	Steel	Air – indoor uncontrolled	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A1.R-66	3.1-1, 096	Reactor nozzle components control rod drive return line nozzles and nozzle-to-vessel welds (BWR-3, BWR-4, BWR-5, and BWR-6 designs)	Steel (with or without stainless steel cladding)	Reactor coolant	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.A1.R-409	3.1-1, 113	Reactor vessel (external attachments): support skirt and stabilizer attachment brackets	Steel	Air – Indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion, wear	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.A1.RP-201	3.1-1, 001	Reactor Vessel Closure Flange Assembly Components: closure flanges, studs	Steel	Air – indoor uncontrolled	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.A1.RP-51	3.1-1, 091	Reactor Vessel Closure Flange Assembly Components: closure flanges, studs, nuts, and washers	High-strength steel	Air – indoor uncontrolled	Cracking due to SCC, IGSCC	AMP XI.M3, "Reactor Head Closure Stud Bolting"	No
-	IV.A1.RP-165	3.1-1, 091	Reactor Vessel Closure Flange Assembly Components: closure flanges, studs, nuts, and washers	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion, wear	AMP XI.M3, "Reactor Head Closure Stud Bolting"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A1.R-04	3.1-1, 007	Reactor vessel components: nozzle penetrations; safe ends; thermal sleeves; vessel shells, heads and welds	Stainless steel, steel (with or without nickel alloy or stainless steel cladding), nickel alloy	Reactor coolant	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.A1.R-61a	3.1-1, 016	Reactor vessel top head flange enclosure assembly: leakage detection line	Stainless steel, nickel alloy	Air – indoor uncontrolled, reactor coolant leakage	Cracking due to SCC, IGSCC	AMP XI.M32, "One-Time Inspection"	Yes
-	IV.A1.R-61b	3.1-1, 016	Reactor vessel top head flange enclosure assembly: leakage detection line	Stainless steel, nickel alloy	Air – indoor uncontrolled, reactor coolant leakage	Cracking due to SCC, IGSCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	IV.A1.RP-157	3.1-1, 085	Reactor Vessel: flanges; nozzles; penetrations; safe ends; vessel shells, heads and welds	Steel (with stainless steel or nickel alloy cladding), stainless steel, nickel alloy	Reactor coolant	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	IV.A1.RP-227	3.1-1, 014	Reactor Vessel: shell and nozzle components (including associated welds) in the beltline region of the vessel	Steel (with or without cladding)	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M31, "Reactor Vessel Material Surveillance," and X.M2, "Neutron Fluence Monitoring"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A1.R-62	3.1-1, 013	Reactor Vessel: shell and nozzle components (including associated welds) in the beltline region of the vessel	Steel (with or without stainless steel cladding)	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, SRP-SLR Section 4.2 "Reactor Vessel Neutron Embrittlement"	Yes
-	IV.A1.RP-50	3.1-1, 084	Top head enclosure (without cladding): top head, top head nozzles (vent, top head spray, reactor core isolation cooling, spare)	Steel	Reactor coolant	Loss of material due to general, pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	IV.A1.R-64	3.1-1, 094	Vessel shell: attachment welds	Stainless steel, nickel alloy	Reactor coolant	Cracking due to SCC, IGSCC, cyclic loading	AMP XI.M4, "BWR Vessel ID Attachment Welds," and AMP XI.M2, "Water Chemistry" (SCC, IGSCC mechanisms only)	No
N	IV.A1.R-457	3.1-1,141	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes
D	IV.A1.R-411	-	-	-	-	-	-	-
D	IV.A1.R-67	-	-	-	-	-	-	-

AMP = aging management program; BWR = boiling water reactor; IGSCC = intergranular stress corrosion cracking; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A2 REACTOR VESSEL (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the pressurized water reactor (PWR) vessel pressure boundary and consists of the vessel shell and flanges, the top closure head and bottom head, the control rod drive mechanism housings, nozzles (including safe ends) for reactor coolant inlet and outlet lines and safety injection, and penetrations through either the closure head or bottom head domes for instrumentation and leakage monitoring tubes. Attachments to the vessel such as core support pads, as well as pressure vessel support and attachment welds, are also included in the table. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all systems, structures, and components (SSCs) that compose the reactor coolant system (RCS) are governed by Group A Quality Standards.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the PWR reactor vessel include the reactor vessel internals (RVIs IV.B2, IV.B3, and IV.B4, respectively, for Westinghouse, Combustion Engineering and Babcock & Wilcox [designs), the RCS and connected lines (IV.C2), and the emergency core cooling system (V.D1).

Table A.2 Reactor Vessel (PWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.A2.RP-154	3.1-1, 019	Bottom-mounted instrument guide tube (external to bottom head)	Stainless steel	Reactor coolant	Cracking due to stress corrosion cracking (SCC)	XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and XI.M2, "Water Chemistry"	No
-	IV.A2.R-78	3.1-1, 062	Control rod drive head penetration: flange bolting	Stainless steel	Air – indoor uncontrolled	Cracking due to SCC	AMP XI.M18, "Bolting Integrity"	No
-	IV.A2.R-79	3.1-1, 065	Control rod drive head penetration: flange bolting	Stainless steel	Air – indoor uncontrolled	Loss of material due to wear	AMP XI.M18, "Bolting Integrity"	No
-	IV.A2.R-80	3.1-1, 066	Control rod drive head penetration: Flange bolting	Stainless steel	Air – indoor uncontrolled	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.RP-186	3.1-1, 045	Control rod drive head penetration: nozzles including associated welds	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No
-	IV.A2.R-77	3.1-1, 050	Control rod drive head penetration: pressure housing	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
-	IV.A2.RP-55	3.1-1, 047	Control rod drive head penetration: pressure housing	Stainless steel, nickel alloy	Reactor coolant	Cracking due to SCC, primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.RP-234	3.1-1, 046	Control rod drive penetration housings, reactor vessel nozzles, nozzle safe ends, and welds	Stainless steel, nickel alloy welds and/or buttering	Reactor coolant	Cracking due to SCC, primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)" for nickel alloy components	No
-	IV.A2.R-414	3.1-1, 117	Control rod drive penetrations: nozzle thermal sleeves	Stainless steel, nickel alloy	Reactor coolant	Loss of material due to wear	Plant-specific aging management program	Yes
-	IV.A2.R-413	3.1-1, 116	Control rod drive penetrations: nozzles	Nickel alloy	Reactor coolant	Loss of material due to wear	Plant-specific aging management program	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.RP-57	3.1-1, 040a	Core support pads; core guide lugs	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
-	IV.A2.RP-379	3.1-1, 048	External surfaces: reactor vessel top head and bottom head	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No
-	IV.A2.R-450	3.1-1, 134	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.R-90	3.1-1, 045	Penetrations: head vent pipe (top head); instrument tubes (top head)	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.RP-59	3.1-1, 045	Penetrations: instrument tubes (bottom head)	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No
-	IV.A2.R-70	3.1-1, 004	Pressure vessel support skirt and attachment welds	Steel	Air – indoor uncontrolled	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.A2.RP-54	3.1-1, 001	Reactor Vessel Closure Flange Assembly Components: closure flanges, studs	Steel	Air – indoor uncontrolled	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.RP-52	3.1-1, 092	Reactor Vessel Closure Flange Assembly Components: closure flanges, studs, nuts, washers	High-strength steel	Air – indoor uncontrolled	Cracking due to SCC, intergranular stress corrosion cracking	AMP XI.M3, "Reactor Head Closure Stud Bolting"	No
-	IV.A2.RP-53	3.1-1, 092	Reactor Vessel Closure Flange Assembly Components: closure flanges, studs, nuts, washers	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion, wear	AMP XI.M3, "Reactor Head Closure Stud Bolting"	No
-	IV.A2.RP-28	3.1-1, 088	Reactor vessel components: Closure flanges; nozzles; penetrations; pressure housings; safe ends; vessel shells, heads; welds	Steel (with stainless steel or nickel alloy cladding), stainless steel, nickel alloy	Reactor coolant	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry"	No
-	IV.A2.R-219	3.1-1, 010	Reactor vessel components: nozzles; penetrations; pressure housings; safe ends; thermal sleeves; vessel shells, heads, welds	Steel (with stainless steel or nickel alloy cladding), stainless steel, nickel alloy	Reactor coolant	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.A2.R-74a	3.1-1, 139	Reactor vessel top head flange enclosure assembly: leakage detection line	Stainless steel, nickel alloy	Air – indoor uncontrolled, reactor coolant leakage	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.R-74b	3.1-1, 139	Reactor vessel top head flange enclosure assembly: leakage detection line	Stainless steel, nickel alloy	Air – indoor uncontrolled, reactor coolant leakage	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	IV.A2.R-17	3.1-1, 049	Reactor Vessel: external surfaces of the vessel (including steel components in the vessel closure flange assembly) and applicable exterior attachments	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	IV.A2.R-85	3.1-1, 018	Reactor vessel: reactor vessel shell base metal components made from forging materials, including applicable cladding interfaces	Steel SA508-Cl 2 forgings clad (with stainless steel) using a high-heat-input welding process	Reactor coolant	Crack growth due to cyclic loading	TLAA, SRP-SLR Section 4.7, "Other Plant-Specific TLAAs"	Yes
-	IV.A2.RP-229	3.1-1, 014	Reactor Vessel: shell and nozzle components (including associated welds) in the beltline region of the vessel	Steel (with or without cladding)	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M31, "Reactor Vessel Material Surveillance," and X.M2, "Neutron Fluence Monitoring"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.A2.R-84	3.1-1, 013	Reactor Vessel: shell and nozzle components (including associated welds) in the beltline region of the vessel	Steel (with stainless steel or nickel alloy cladding)	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, SRP-SLR Section 4.2 "Reactor Vessel Neutron Embrittlement"	Yes
-	IV.A2.R-87	3.1-1, 037	Vessel shell: vessel flange	Steel	Reactor coolant	Loss of material due to wear	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
N	IV.A2.R-457	3.1-1, 141	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel Alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes
D	IV.A2.R-81	-	-	-	-	-	-	-
D	IV.A2.RP-228	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; CASS = cast austenitic stainless steel; PWR = pressurized-water reactor; RCPB = reactor coolant pressure boundary; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

B REACTOR VESSEL INTERNALS

B1 REACTOR VESSEL INTERNALS (BOILING WATER REACTOR)

Systems, Structures, and Components

This section addresses the boiling water reactor vessel internals and consists of the core shroud (including repairs) and core plate, the top guide, feedwater spargers, core spray lines and spargers, jet pump assemblies, fuel supports and control rod drive, and instrument housings, such as the intermediate range monitor dry tubes, the low-power range monitor dry tubes, and the source range monitor dry tubes. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all structures and components that compose the reactor vessel are governed by Group A or B Quality Standards.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the reactor vessel internals include the reactor pressure vessel (IV.A1) and the reactor coolant pressure boundary (IV.C1).

Table B.1 Reactor Vessel Internals (BWR)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B1.R-416	3.1-1, 099	Control rod guide tube base	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F), neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	AMP XI.M9, "BWR Vessel Internals"	No
M	IV.B1.R-95	3.1-1, 041	Core plate access hole cover (mechanical designs)	Nickel alloy	Reactor coolant, neutron flux	Cracking due to stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), irradiation-assisted SCC (IASCC)	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.R-94	3.1-1, 029	Core plate access hole cover (welded designs)	Nickel alloy	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B1.R-420	3.1-1, 120	Core plate rim hold-down bolts	Stainless steel	Reactor coolant, neutron flux	Loss of preload due to thermal or irradiation-enhanced stress relaxation	AMP XI.M9, "BWR Vessel Internals," and TLAA SRP-SLR 4.7 "Other Plant-Specific TLAAs" [if an analysis is performed as part of the aging management basis and conforms to the definition of a TLAA in 10 CFR 54.3(a)]	Yes
M	IV.B1.R-92	3.1-1, 103	Core shroud (including repairs) and core plate: core shroud (upper, central, lower)	Stainless steel	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.R-96	3.1-1, 103	Core shroud (including repairs) and core plate: shroud support structure (shroud support cylinder, shroud support plate, shroud support legs)	Nickel alloy	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.R-93	3.1-1, 103	Core shroud and core plate: core plate and plate bolts (used in early BWRs)	Stainless steel	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B1.R-97	3.1-1, 103	Core shroud and core plate: Low Pressure Coolant Injection (LPCI) coupling	Stainless steel	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.R-99	3.1-1, 103	Core spray lines and spargers: core spray lines (headers); spray rings; spray nozzles; thermal sleeves	Stainless steel	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.R-417	3.1-1, 099	Core spray spargers, sparger nozzles	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F), neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	AMP XI.M9, "BWR Vessel Internals"	No
-	IV.B1.R-104	3.1-1, 102	Fuel supports and control rod drive assemblies: control rod drive housing	Stainless steel	Reactor coolant	Cracking due to SCC, IGSCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.RP-220	3.1-1, 099	Fuel supports and control rod drive assemblies: orificed fuel support	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F), neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	AMP XI.M9, "BWR Vessel Internals"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B1.R-105	3.1-1, 103	Instrumentation: Intermediate range monitor dry tubes; source range monitor (SRM) dry tubes; incore neutron flux monitor guide tubes	Stainless steel	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.RP-219	3.1-1, 099	Jet pump assemblies: castings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F), neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	AMP XI.M9, "BWR Vessel Internals"	No
M	IV.B1.R-100	3.1-1, 103	Jet pump assemblies: thermal sleeve; inlet header; riser brace arm; hold-down beams; inlet elbow; mixing assembly; diffuser castings	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
-	IV.B1.R-421	3.1-1, 121	Jet pump assembly hold-down beam bolts	Stainless steel	Reactor coolant, neutron flux	Loss of preload due to thermal or irradiation-enhanced stress relaxation	AMP XI.M9, "BWR Vessel Internals"	No
M	IV.B1.R-419	3.1-1, 099	LPCI Coupling	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F), neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	AMP XI.M9, "BWR Vessel Internals"	No
-	IV.B1.R-53	3.1-1, 003	Reactor vessel internal components	Stainless steel, nickel alloy	Reactor coolant	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B1.RP-381	3.1-1, 104	Reactor vessel internals components	Nickel alloy	Reactor coolant, neutron flux	Cracking due to IGSCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.RP-182	3.1-1, 099	Reactor vessel internals components	Precipitation-hardening (PH) martensitic stainless steel (17-4PH and 15-5PH); martensitic stainless steel (stainless steel 403, 410, 431, etc.)	Reactor coolant >250°C (>482°F), neutron flux	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement	AMP XI.M9, "BWR Vessel Internals"	No
-	IV.B1.RP-26	3.1-1, 043	Reactor vessel internals components	Stainless steel, nickel alloy	Reactor coolant	Loss of material due to pitting, crevice corrosion	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
M	IV.B1.RP-200	3.1-1, 099	Reactor vessel internals components	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M9, "BWR Vessel Internals"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B1.R-422	3.1-1, 103	Reactor vessel internals components	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cracking due to IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No
-	IV.B1.RP-377	3.1-1, 100	Reactor vessel internals components: Jet pump wedge surface	Stainless steel	Reactor coolant	Loss of material due to wear	AMP XI.M9, "BWR Vessel Internals"	No
-	IV.B1.RP-155	3.1-1, 101	Steam dryers	Stainless steel	Reactor coolant	Cracking due to flow-induced vibration; SCC; IGSCC; loss of material due to wear	AMP XI.M9, "BWR Vessel Internals"	No
M	IV.B1.R-98	3.1-1, 103	Top guide	Stainless steel	Reactor coolant, neutron flux	Cracking due to SCC, IGSCC, IASCC	AMP XI.M9, "BWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	No

AMP = aging management program; BWR = boiling water reactor; IASCC = irradiation-assisted SCC; IGSCC = intergranular stress corrosion cracking; LPCI = Low Pressure Coolant Injection; PH = precipitation-hardening; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; SRM = source range monitor; TLAA = Time-Limited Aging Analysis.

B2 REACTOR VESSEL INTERNALS (PRESSURIZED WATER REACTOR)—WESTINGHOUSE

Systems, Structures, and Components

This section addresses the Westinghouse pressurized water reactor vessel internals, which consist of components in the upper internals assembly, the control rod guide tube assembly, the core barrel assembly, the baffle/former assembly, the lower internals assembly, lower support assembly, thermal shield assembly, bottom mounted instrumentation system, and alignment and interfacing components.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the reactor vessel internals include the reactor pressure vessel (IV.A2).

Table B.2 Reactor Vessel Internals (PWR)—Westinghouse

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B2.RP-300	3.1-1, 059a	Alignment and interfacing components: internals hold down spring	Stainless steel	Reactor coolant and neutron flux	Loss of preload due to thermal and irradiation-enhanced stress relaxation; changes in dimensions due to void swelling or distortion; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-301	3.1-1, 053c	Alignment and interfacing components: upper core plate alignment pins	Stainless steel	Reactor coolant and neutron flux	Cracking due to stress corrosion cracking (SCC) or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
-	IV.B2.RP-299	3.1-1, 059c	Alignment and interfacing components: upper core plate alignment pins	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-271	3.1-1, 053a	Baffle-to-former assembly: baffle-to-former bolts (includes corner bolts)	Stainless steel	Reactor coolant and neutron flux	Cracking due to Irradiation-assisted SCC (IASCC) or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-272	3.1-1, 059a	Baffle-to-former assembly: baffle-to- former bolts (includes corner bolts)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; changes in dimensions due to void swelling or distortion; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-270	3.1-1, 059a	Baffle-to-former assembly: baffle and former plates	Stainless steel	Reactor coolant and neutron flux	Changes in dimensions due to void swelling or distortion; loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-270a	3.1-1, 053a	Baffle-to-former assembly: baffle and former plates	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-275	3.1-1, 053a	Baffle-to-former assembly: baffle-edge bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-354	3.1-1, 059a	Baffle-to-former assembly: baffle-edge bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; changes in dimensions due to void swelling or distortion; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
E	IV.B2.RP-273	3.1-1, 053b	Baffle-to-former assembly: barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-274	3.1-1, 059b	Baffle-to-former assembly: barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; changes in dimensions due to void swelling or distortion; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B2.RP-284	3.1-1, 054	Bottom mounted instrument system: flux thimble tubes	Stainless steel (with or without chrome plating)	Reactor coolant, neutron flux	Loss of material due to wear	AMP XI.M37, "Flux Thimble Tube Inspection"	No
M	IV.B2.RP-293	3.1-1, 053b	Bottom-mounted instrumentation system: bottom-mounted instrumentation (BMI) column bodies	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-292	3.1-1, 059b	Bottom-mounted instrumentation system: BMI column bodies	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-296	3.1-1, 059a	Control rod guide tube (CRGT) assemblies: CRGT guide plates (cards)	Stainless steel (including cast austenitic stainless steel [CASS])	Reactor coolant and neutron flux	Loss of material due to wear; loss of fracture toughness due to thermal aging embrittlement (CASS only)	AMP XI.M16A, "PWR Vessel Internals"	Yes
N	IV.B2.RP-296a	3.1-1, 053a	CRGT assemblies: CRGT guide plates (cards)	Stainless steel (including CASS)	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC Mechanisms only)	Yes
M	IV.B2.RP-298	3.1-1, 053a	CRGT assemblies: lower flange welds (accessible) in outer (peripheral) CRGT assemblies	Stainless steel	Reactor coolant and neutron flux	SCC, IASCC, or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
N	IV.B2.RP-298a	3.1-1, 053b	CRGT assemblies: lower flange welds in remaining (nonperipheral) CRGT assemblies	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC, or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-297	3.1-1, 059a	CRGT assemblies: lower flange welds in outer (peripheral) CRGT assemblies	Stainless steel (including CASS)	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement and for CASS, due to thermal aging embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
N	IV.B2.RP-297a	3.1-1, 059b	CRGT assemblies: lower flange welds in the remaining (nonperipheral) CRGT assemblies	Stainless steel (including CASS)	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement, and for CASS, due to thermal aging embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-355	3.1-1, 028	CRGT assemblies: guide tube support pins (split pins)	Nickel alloy (X-750)	Reactor coolant and neutron flux	Cracking due to SCC or fatigue; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only) – using plant-specific evaluation per Materials Reliability Program guidelines	Yes
M	IV.B2.RP-345	3.1-1, 059c	Core barrel assembly: core barrel flange	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	IV.B2.RP-345a	3.1-1, 053c	Core barrel assembly: core barrel flange	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-280	3.1-1, 053b	Core barrel assembly: lower flange weld (core barrel to- support plate weld), upper circumferential (girth) weld, and upper vertical (axial) welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC (lower flange weld only), or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
N	IV.B2.RP-280a	3.1-1, 059b	Core barrel assembly; lower flange weld (core barrel-to-support plate weld)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-387	3.1-1, 053a	Core barrel assembly lower circumferential (girth) welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, intergranular stress corrosion cracking, or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-388	3.1-1, 059a	Core barrel assembly: lower circumferential (girth) welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement, changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-387a	3.1-1, 053b	Core barrel assembly: middle vertical (axial) welds and lower core barrel vertical (axial) welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-388a	3.1-1, 059b	Core barrel assembly: middle vertical (axial) welds and lower core barrel vertical (axial) welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation Embrittlement; changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-276	3.1-1, 053a	Core barrel assembly: upper flange weld	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-285	3.1-1, 059c	Alignment and interfacing components: clevis Inserts (including bolts or screws, and clevis insert Surfaces)	Stainless steel, nickel alloy (including alloy 600, X-750), stellite (for insert surfaces only)	Reactor coolant and neutron flux	Loss of material due to wear; loss of preload due to thermal or irradiation-enhanced stress relaxation or creep (bolts and screws only); changes in dimension due to distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-399	3.1-1, 053c	Alignment and interfacing components: clevis inserts (including bolts or screws, dowels, and clevis Insert surfaces)	Stainless steel, nickel alloy (including Alloy 600. X-750)	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-289	3.1-1, 053c	Lower internals assembly: lower core plate or extra-long (XL) lower core plate	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-288	3.1-1, 059c	Lower internals assembly: lower core plate or XL lower core plate	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of material due to wear changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-291a	3.1-1, 053b	Lower internals assembly: lower support forging or casting	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-290a	3.1-1, 059b	Lower internals assembly: lower support casting	CASS	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-291	3.1-1, 053b	Lower support assembly: lower support column bodies (cast)	CASS	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-290	3.1-1, 059b	Lower support assembly: lower support column bodies (cast)	CASS	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging and neutron irradiation Embrittlement changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-294	3.1-1, 053b	Lower support assembly: lower support column bodies (non-cast)	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
E	IV.B2.RP-295	3.1-1, 059b	Lower support assembly: lower support column bodies (non-cast)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
E	IV.B2.RP-286	3.1-1, 053b	Lower support assembly: lower support column bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-287	3.1-1, 059b	Lower support assembly: lower support column bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; changes in dimension due to void swelling or distortion; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B2.RP-265	3.1-1, 055c	Reactor vessel internal "No Additional Measures" components	Stainless steel, nickel alloy	Reactor coolant and neutron flux	No additional aging management for reactor internal "No Additional Measures" components unless required by ASME Section XI, Examination Category B-N-3 or relevant operating experience exists	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.R-423	3.1-1, 118	Reactor vessel internal components or license renewal application/subsequent license renewal application (LRA/SLRA)-specified reactor vessel internal component	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cracking due to SCC, IASCC, cyclic loading, fatigue	Plant-specific aging management program, or AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (SCC and IASCC only), with an adjusted site-specific or component-specific aging management basis for a specified reactor vessel internal component	Yes
M	IV.B2.R-424	3.1-1, 119	Reactor vessel internal components or LRA/SLRA-specified reactor vessel internal component	Stainless steel, nickel alloy stellite (as a wear-resistant surface)	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement or thermal aging embrittlement; changes in dimensions due to void swelling or distortion; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of material due to wear	Plant-specific aging management program, or AMP XI.M16A, “PWR Vessel Internals,” with an adjusted site-specific or component specific aging management basis for a specified reactor vessel internal component	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B2.RP-24	3.1-1, 087	Reactor vessel internal components	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry"	No
-	IV.B2.RP-303	3.1-1, 003	Reactor vessel internal components: internals with metal fatigue analyses or other types of cyclical loading analyses	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.B2.RP-302a	3.1-1, 059a	Thermal shield assembly: thermal shield flexures	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B2.RP-302	3.1-1, 053a	Thermal shield assembly: thermal shield flexures	Stainless steel	Reactor coolant and neutron flux	Cracking due to SSC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
-	IV.B2.RP-346	3.1-1, 053c	Upper internals assembly: upper support ring or skirt	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B2.RP-291b	3.1-1, 053b	Upper internals assembly; upper core plate	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B2.RP-290b	3.1-1, 059b	Upper internals assembly; upper core plate	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear, loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
D	IV.B2.RP-356	-	-	-	-	-	-	-
D	IV.B2.RP-278	-	-	-	-	-	-	-
D	IV.B2.RP-278a	-	-	-	-	-	-	-
D	IV.B2.RP-382	-	-	-	-	-	-	-

AMP = aging management program; BMI = bottom-mounted instrumentation; CASS = cast austenitic stainless steel; CRGT = Control rod guide tube; IASCC = irradiation-assisted SCC; IGSCC = intergranular stress corrosion cracking; LRA = license renewal application; PWR = pressurized-water reactor; SCC = stress corrosion cracking; SRM = source range monitor; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; TLAA = Time-Limited Aging Analysis; XL = extra-long.

B3 REACTOR VESSEL INTERNALS (PRESSURIZED WATER REACTOR)— COMBUSTION ENGINEERING

Systems, Structures, and Components

This section addresses the Combustion Engineering pressurized water reactor vessel internals, which consist of components in the upper internals assembly, the control element assembly, the core support barrel assembly, the core shroud assembly, and the lower support structure assembly, and incore instrumentation components.

Common miscellaneous material/environment combinations, where aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the reactor vessel internals include the reactor pressure vessel (IV.A2).

Table B.3 Reactor Vessel Internals (PWR)—Combustion Engineering

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-313	3.1-1, 052b	Control element assembly (CEA) – Shroud Assemblies remaining instrument guide tubes (i.e., guide tubes in non-peripheral control element shroud assemblies)	Stainless steel	Reactor coolant and neutron flux	Cracking due to stress corrosion cracking (SCC) or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-312	3.1-1, 052a	CEA–) Shroud Assemblies: instrument guide tubes in peripheral CEA shroud assemblies	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-320	3.1-1, 052c	Core shroud and upper internals assemblies: guide lugs; guide lug insert and bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-319	3.1-1, 056c	Core shroud and upper internals assemblies: guide lugs; guide lug inserts and bolts	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear; Loss of preload due to thermal and irradiation-enhanced stress relaxation or creep	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-358	3.1-1, 052a	Core shroud assemblies (for bolted core shroud assemblies): assembly components, including core side surfaces, shroud plates and plate joints, and bolts and bolt locking devices	Stainless steel	Reactor coolant and neutron flux	Cracking due to irradiation-assisted SCC (IASCC)	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-318	3.1-1, 056a	Core shroud assemblies (for bolted core shroud assemblies): assembly components, including core side surfaces, shroud plates and plate joints, and bolts and bolt locking devices	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; changes in dimensions due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
E	IV.B3.RP-316	3.1-1, 052b	Core shroud assemblies (for bolted core shroud assemblies): barrel-shroud bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B3.RP-317	3.1-1, 056b	Core shroud assemblies (for bolted core shroud assemblies): barrel-shroud bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
E	IV.B3.RP-314	3.1-1, 052a	Core shroud assemblies (for bolted core shroud assemblies): core shroud bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-315	3.1-1, 056a	Core shroud assemblies (for bolted core shroud assemblies): core shroud bolts	Stainless steel	Reactor coolant and neutron flux	Loss of preload due to thermal and irradiation- enhanced stress relaxation or creep; loss of fracture toughness due to neutron irradiation embrittlement: changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-326	3.1-1, 056a	Core shroud assembly (for welded shroud designs assembled in two vertical sections): assembly (including the horizontal seam between the upper and lower shroud segments	Stainless steel	Reactor coolant and neutron flux	Changes in dimensions due to void swelling or distortion; loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-322	3.1-1, 052a	Core shroud assembly (for welded core shroud designs assembled in two vertical sections): core shroud plate-to-former plate welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-359	3.1-1, 056a	Core shroud assembly (for welded core shroud designs assembled in two vertical sections): core shroud plate-to-former plate welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; changes in dimensions due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-323	3.1-1, 052b	Core shroud assembly (for welded core shroud designs assembled in two vertical sections): remaining axial welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-359a	3.1-1, 056b	Core shroud assembly (for welded core shroud designs assembled in two vertical sections): remaining axial welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-325	3.1-1, 052b	Core shroud assembly (or core shroud designs assembled with full-height shroud plates): remaining axial welds, ribs, and rings	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-361	3.1-1, 056b	Core shroud assembly (for core shroud designs assembled with full-height shroud plates): remaining axial welds, ribs, and rings	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-360	3.1-1, 056a	Core shroud assembly (for core shroud designs assembled with full-height shroud plates): shroud plates (including visible axial weld seams at the core shroud re-entrant corners and at the core midplane)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement: changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-324	3.1-1, 052a	Core shroud assembly (core shroud designs assembledwith full-height shroud plates): shroud plates (including visible axial weld seams at the core shroud re-entrant corners and at the core mid- plane	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-328	3.1-1, 052a	Core support barrel assembly: flexure weld	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-362	3.1-1, 056a	Core support barrel assembly: middle circumferential (girth) weld	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-362a	3.1-1, 052a	Core support barrel assembly: middle circumferential (girth) weld	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or IASCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-362c	3.1-1, 052b	Core support barrel assembly: middle vertical (axial) welds and lower vertical (axial) welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC or IASCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-362b	3.1-1, 056b	Core support barrel assembly: middle vertical (axial) welds and lower vertical (axial) welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-333	3.1-1, 052b	Core support barrel assembly: lower girth weld (lower flange weld)	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
N	IV.B3.RP-333a	3.1-1, 056b	Core support barrel assembly: lower girth weld (lower flange weld)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-332	3.1-1, 056c	Core support barrel assembly: upper flange	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-327	3.1-1, 052a	Core support barrel assembly: upper flange weld	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.R-455	3.1-1, 056b	Core support barrel assembly: upper circumferential (girth) weld and upper vertical (axial) welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-329	3.1-1, 052b	Core support barrel assembly: upper circumferential (girth) weld and upper vertical (axial) welds	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
E	IV.B3.RP-357	3.1-1, 056c	Incore instruments (ICI): ICI thimble tubes - lower	Zircaloy-4	Reactor coolant and neutron flux	Loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-363	3.1-1, 052b	Lower support structure (all plants with either full height bolted or half height welded shroud plates): core support columns	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC, or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-364	3.1-1, 056b	Lower support structure (all plants with either full height bolted or half height welded shroud plates): core support columns	Stainless steel (including cast austenitic stainless steel [CASS])	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation and thermal embrittlement (TE for CASS materials only)	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-334	3.1-1, 052c	Lower support structure (for Combustion Engineering [CE] plants with core shroud designs assembled in two vertical sections or from full-height shroud plates): fuel alignment pins	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC, or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-336	3.1-1, 056c	Lower support structure (for CE plants with core shroud designs assembled in two vertical sections or from full height shroud plates): fuel alignment pins	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear; loss of fracture toughness due to neutron irradiation embrittlement; loss of preload due to thermal and irradiation- enhanced stress relaxation or creep	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-335	3.1-1, 052b	Lower support structure (all CE plants except those with welded core shroud designs assembled from full-height shroud plates): lower core support beams	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-343	3.1-1, 052a	Lower support structure (for CE plant designs with a core support plate): core support plate	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-365	3.1-1, 056a	Lower support structure (for CE plant designs with a core support plate): core support plate	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.RP-342	3.1-1, 052a	Lower support structure (for CE plants with welded core shroud designs assembled from full height shroud plates): deep beams	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, IASCC, or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-366	3.1-1, 056a	Lower support structure (for CE plants with welded core shroud designs assembled from full height shroud plates): deep beams	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.RP-330	3.1-1, 052b	Lower support structure: (for CE plants with bolted designs): core support column bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B3.RP-331	3.1-1, 056b	Lower support structure: (for CE plants with bolted designs): core support column bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B3.RP-306	3.1-1, 055b	Reactor internal "No Additional Measures" components	Stainless steel, nickel alloy	Reactor coolant and neutron flux	No additional aging management for reactor internal "No Additional Measures" components unless required by ASME Section XI, Examination Category B-N-3 or relevant operating experience exists	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B3.R-423	3.1-1, 118	Reactor vessel internal components or license renewal application/subsequent license renewal application (LRA/SLRA) specified reactor vessel internal component	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cracking due to SCC, IASCC, cyclic loading, fatigue	Plant-specific aging management program or AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (SCC and IASCC only), with an adjusted site-specific or component-specific aging management basis for a specified reactor vessel internal component	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B3.R-424	3.1-1, 119	Reactor vessel internal components or LRA/SLRA-specified reactor vessel internal component	Stainless steel, nickel alloy, stellite (as a wear-resistant surface)	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement or thermal aging embrittlement; changes in dimensions due to void swelling or distortion; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of material due to wear	Plant-specific aging management program, or AMP XI.M16A, “PWR Vessel Internals,” with an adjusted site-specific or component-specific aging management basis for a specified reactor vessel internal component	Yes
-	IV.B3.RP-24	3.1-1, 087	Reactor vessel internal components	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry"	No
-	IV.B3.RP-339	3.1-1, 003	Reactor vessel internal components: internals with metal fatigue analyses or other types of cyclical loading analyses	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
M	IV.B3.RP-338	3.1-1, 052a	Upper internals assembly (for CE plants with core shroud designs assembled from full height shroud plates): fuel alignment plate	Stainless steel	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	IV.B3.RP-338a	3.1-1, 056a	Upper internals assembly (for CE plants with core shroud designs assembled from full height shroud plates): fuel alignment plate	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
N	IV.B3.RP-320a	3.1-1, 052c	Alignment and Interfacing Components: core stabilizing lugs, shims and bolts	Stainless, steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals"	Yes
D	IV.B3.RP-326a	-	-	-	-	-	-	-
D	IV.B3.RP-400	-	-	-	-	-	-	-
D	IV.B3.RP-334a	-	-	-	-	-	-	-
D	IV.B3.RP-382	-	-	-	-	-	-	-

AMP = aging management program; CASS = cast austenitic stainless steel; CE = Combustion Engineering; CEA = control element assembly; IASCC = irradiation-assisted SCC; ICI = incore instruments; LRA = license renewal application; PWR = pressurized-water reactor; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; SRM = source range monitor; TLAA = Time-Limited Aging Analysis.

B4 REACTOR VESSEL INTERNALS (PRESSURIZED WATER REACTOR) – BABCOCK AND WILCOX

Systems, Structures, and Components

This section addresses the Babcock & Wilcox pressurized water reactor vessel internals, which consist of components in the plenum cover assembly, the upper grid assembly, the control rod guide tube assembly, the core support shield assembly, the core barrel assembly, the lower grid assembly, incore monitoring instrumentation guide tube assembly, and the flow distributor assembly.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the reactor vessel internals include the reactor pressure vessel (IV.A2).

Table B.4 Reactor Vessel Internals (PWR)—Babcock & Wilcox

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B4.RP-242	3.1-1, 058a	Control rod guide tube (CRGT) assembly: CRGT spacer castings	Cast austenitic stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B4.RP-242a	3.1-1, 051a	CRGT assembly: CRGT spacer castings	Stainless steel (including cast austenitic stainless steel [CASS])	Reactor coolant and neutron flux	Cracking due to stress corrosion cracking (SCC) or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
-	IV.B4.RP-245a	3.1-1, 051b	Core barrel assembly (applicable to Davis Besse only): surveillance specimen holder tube (SSHT) stud or bolt locking devices	Nickel alloy	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B4.RP-245b	3.1-1, 058b	Core barrel assembly (applicable to Davis Besse only): SSHT stud or bolt locking devices	Nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; changes in dimensions due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-245	3.1-1, 051b	Core barrel assembly (applicable to Davis Besse only): SSH) studs/nuts or bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	IV.B4.RP-245c	3.1-1, 058b	Core barrel assembly (applicable to Davis Besse only): SSHT studs or bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; loss of preload due to thermal or irradiation enhanced stress relaxation or creep	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-247	3.1-1, 051a	Core barrel assembly: lower core barrel (LCB) bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	Yes
-	IV.B4.RP-249	3.1-1, 058a	Core barrel assembly: baffle plates	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-241	3.1-1, 051a	Core barrel assembly: baffle-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to SCC, iIrradiation-assisted SCC (IASCC), fatigue, or overload	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B4.RP-240	3.1-1, 058a	Core barrel assembly: baffle-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of preload due to thermal and irradiation-enhanced stress relaxation; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.B4.RP-250	3.1-1, 058b	Core barrel assembly: core barrel cylinder (including vertical and circumferential seam welds); former plates	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-244	3.1-1, 051b	Core barrel assembly: baffle-to-baffle bolts and core barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC, fatigue, or overload	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (IASCC only)	Yes
M	IV.B4.RP-243	3.1-1, 058b	Core barrel assembly: baffle-to-baffle bolts and core barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of material due to wear	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-240a	3.1-1, 058a	Core barrel assembly: locking devices (including locking welds) of baffle-to-former bolts and internal baffle-to-baffle bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.RP-241a	3.1-1, 051a	Core barrel assembly: locking devices of baffle-to-former bolts and internal baffle-to-baffle bolts	Stainless steel	Reactor coolant and neutron flux	Cracking due to IASCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B4.RP-243a	3.1-1, 058b	Core barrel assembly: locking devices (including locking welds) of external baffle-to-baffle bolts and core barrel-to-former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B4.RP-247a	3.1-1, 051a	Core barrel assembly: LCB bolt locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B4.RP-247b	3.1-1, 058a	Core barrel assembly: LCB bolt locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; changes in dimensions due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
N	IV.B4.RP-247c	3.1-1, 058a	Core barrel Assembly LCB bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.RP-248	3.1-1, 051a	Core support shield (CSS) assembly: upper core barrel (UCB) bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (SCC only)	Yes
-	IV.B4.RP-251	3.1-1, 058a	CSS assembly: CSS top flange	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear; loss of preload (wear)	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-252	3.1-1, 058a	Vent valve assembly: vent valve top and bottom retaining rings	CASS and precipitation hardened stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B4.RP-248a	3.1-1, 051a	CSS assembly: UCB bolt locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes
	IV.B4.RP-248b	3.1-1, 058a	CSS assembly: UCB bolt locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; changes in dimensions due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
E	IV.B4.RP-256a	3.1-1, 051a	Flow distributor assembly: flow distributor (FD) bolt locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes
E	IV.B4.RP-256b	3.1-1, 058a	Flow distributor assembly: FD bolt locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; changes in dimensions due to distortion or void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.RP-256	3.1-1, 051a	Flow distributor assembly: FD bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	Yes
M	IV.B4.RP-259	3.1-1, 058a	Incore monitoring instrument (IMI) guide tube assembly: IMI guide tube spider-to-lower grid rib sections welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-258	3.1-1, 058a	IMI guide tube assembly: IMI guide tube spiders	Stainless steel, including CASS	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement or thermal aging embrittlement (for spiders made from CASS)	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-262	3.1-1, 051b	Lower grid assembly: dowel-to-lower grid fuel assembly support pad welds (all plants, including alternate weld configurations at Davis Besse)	Nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B4.RP-261	3.1-1, 051a	Lower grid assembly: dowel-to-guide block welds (all plants except Davis Besse)	Nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.RP-246a	3.1-1, 051b	Lower grid assembly: lower thermal shield (LTS) bolt/stud locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-246b	3.1-1, 058b	Lower grid assembly: LTS bolt/stud locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; changes in dimensions due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-246	3.1-1, 051b	Lower grid assembly: LTS bolts or studs/nuts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry"	Yes
N	IV.B4.RP-246c	3.1-1, 051b	Core barrel assembly: Unified Thread Standard (UTS) bolts	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, “Water Chemistry”	Yes
N	IV.B4.RP-246d	3.1-1, 051b	Core barrel assembly: UTS bolt locking devices	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Cracking due to fatigue	AMP XI.M16A, "PWR Vessel Internals"	Yes
N	IV.B4.RP-246e	3.1-1, 058b	Core barrel assembly: UTS bolt locking devices	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of material due to wear; changes in dimension due to void swelling or distortion	AMP XI.M16A, "PWR Vessel Internals"	Yes
M	IV.B4.RP-260	3.1-1, 058b	Lower grid assembly: pads; pad-to-rib section welds; dowels, cap screws and their locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.RP-260a	3.1-1, 051b	Lower grid assembly: pads; pad-to-rib section welds; dowels, cap screws and their locking devices	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC or fatigue	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
M	IV.B4.RP-251a	3.1-1, 058a	Plenum cover assembly: plenum cover weldment rib pads, plenum cover support flange, plenum cover support ring	Stainless steel	Reactor coolant and neutron flux	Loss of material due to wear; loss of preload (wear)	AMP XI.M16A, "PWR Vessel Internals"	Yes
-	IV.B4.RP-236	3.1-1, 055a	Reactor vessel internal "No Additional Measures" components	Stainless steel, nickel alloy	Reactor coolant and neutron flux	No additional aging management for reactor internal "No Additional Measures" components unless required by ASME Section XI, Examination Category B-N-3 or relevant operating experience exists	AMP XI.M16A, "PWR Vessel Internals"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.R-423	3.1-1, 118	Reactor vessel internal components or License renewal application/sub-sequent license renewal application (LRA/SLRA)-specified reactor vessel internal component	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cracking due to SCC, IASCC, cyclic loading, fatigue	Plant-specific aging management program, or AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (SCC and IASCC only), with an adjusted site-specific or component-specific aging management basis for a specified reactor vessel internal component	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.R-424	3.1-1, 119	Reactor vessel internal components, or LRA/SLRA-specified reactor vessel internal component	Stainless steel, nickel alloy, stellite (as a wear resistant surface material)	Reactor coolant, neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement or thermal aging embrittlement; changes in dimensions due to void swelling or distortion; loss of preload due to thermal and irradiation-enhanced stress relaxation or creep; loss of material due to wear	Plant-specific aging management program, or AMP XI.M16A, "PWR Vessel Internals," with an adjusted site-specific or component-specific aging management basis for a specified reactor vessel internal component	Yes
-	IV.B4.RP-24	3.1-1, 087	Reactor vessel internal components	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry"	No
-	IV.B4.RP-376	3.1-1, 015	Reactor vessel internal components	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Reduction in fracture toughness due to neutron irradiation	TLAA, SRP-SLR Section 4.7, "Other Plant-Specific TLAAs"	Yes
-	IV.B4.R-53	3.1-1, 003	Reactor vessel internal components: internals with metal fatigue analyses or other types of cyclic loading analyses	Stainless steel, nickel alloy	Reactor coolant, neutron flux	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.B4.RP-352	3.1-1, 051b	Upper grid assembly: dowel-to-upper grid fuel assembly support pad welds (all plants including alternate weld configuration at Davis-Besse)	Nickel alloy	Reactor coolant and neutron flux	Cracking due to SCC	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
N	IV.B4.RP-386	3.1-1, 058b	Lower grid assembly: lower grid rib section	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement	AMP XI.M16A, "PWR Vessel Internals," and AMP XI.M2, "Water Chemistry" (for SCC mechanisms only)	Yes
D	IV.B4.RP-375	-	-	-	-	-	-	-
D	IV.B4.RP-375a	-	-	-	-	-	-	-
D	IV.B4.RP-249a	-	-	-	-	-	-	-
D	IV.B4.RP-250a	-	-	-	-	-	-	-
D	IV.B4.RP-244a	-	-	-	-	-	-	-
D	IV.B4.RP-252a	-	-	-	-	-	-	-
D	IV.B4.RP-400	-	-	-	-	-	-	-
D	IV.B4.RP-401	-	-	-	-	-	-	-
D	IV.B4.RP-258a	-	-	-	-	-	-	-
D	IV.B4.RP-259a	-	-	-	-	-	-	-
D	IV.B4.RP-254b	-	-	-	-	-	-	-
D	IV.B4.RP-254a	-	-	-	-	-	-	-
D	IV.B4.RP-254	-	-	-	-	-	-	-
D	IV.B4.RP-382	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; CASS = cast austenitic stainless steel; CRGT = Control rod guide tube; FD = flow distributor; ICI = incore instruments; IMI = incore monitoring instrumentation; LCB = lower core barrel; LRA = license renewal application; LTS = lower thermal shield; PWR = pressurized water reactor; SCC = stress corrosion cracking; SLRA = sub-sequent license renewal application; SRM = source range monitor; SRP= Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; SSHT = surveillance specimen holder tube; TLAA = Time-Limited Aging Analysis; UCB = upper core barrel.

C REACTOR COOLANT

C1 REACTOR COOLANT PRESSURE BOUNDARY (BOILING WATER REACTOR)

Systems, Structures, and Components

This section addresses the boiling water reactor primary coolant pressure boundary, which consists of the reactor coolant recirculation system and portions of other systems connected to the pressure vessel extending to the second containment isolation valve or to the first anchor point outside containment. The connected systems include the residual heat removal, low–pressure core spray, high-pressure core spray, low-pressure coolant injection high-pressure coolant injection, reactor core isolation cooling, isolation condenser, reactor water cleanup, SLC feedwater (FW), and main steam (MS) systems; and the steam line to the high pressure coolant injection and reactor core isolation cooling pump turbines. Based on Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all systems, structures and components (SSCs) that compose the reactor coolant pressure boundary (RCPB) are governed by Group A Quality Standards.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the RCPB include the reactor pressure vessel (IV.A1), the emergency core cooling system (V.D2), the SLC system (VII.E2), the reactor water cleanup system (VII.E3), the shutdown cooling system (older plants) (VII.E4), the MS system (VIII.B2), and the FW system (VIII.D2).

Table C.1 Reactor Coolant Pressure Boundary (BWR)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C1.R-448	3.1-1, 133	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	IV.C1.RP-230	3.1-1, 039	Class 1 piping, fittings and branch connections < nominal pipe size (NPS) 4	Stainless steel, steel (with or without nickel alloy or stainless steel cladding), nickel alloy	Reactor coolant	Cracking due to stress corrosion cracking (SCC; for stainless steel or nickel alloy surfaces exposed to reactor coolant only), intergranular stress corrosion cracking (IGSCC; for stainless steel or nickel alloy surfaces exposed to reactor coolant only), thermal, mechanical, vibratory loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," AMP XI.M2, "Water Chemistry," and XI.M35, "ASME Code Class 1 Small-bore Piping"	No
-	IV.C1.R-52	3.1-1, 050	Class 1 piping, piping components, including pump casings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
-	IV.C1.R-08	3.1-1, 038	Class 1 valve bodies and bonnets	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.C1.R-11	3.1-1, 062	Closure bolting	High-strength steel, stainless steel	Air – indoor uncontrolled	Cracking due to SCC	AMP XI.M18, "Bolting Integrity"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C1.RP-42	3.1-1, 063	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled	Loss of material due to general (steel only), pitting, crevice corrosion, wear	AMP XI.M18, "Bolting Integrity"	No
-	IV.C1.RP-43	3.1-1, 067	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No
-	IV.C1.R-15	3.1-1, 017	Isolation condenser components	Stainless steel	Reactor coolant	Cracking due to SCC, IGSCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	Yes
--	IV.C1.R-225	3.1-1, 021	Isolation condenser components	Steel; stainless steel	Reactor coolant	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	Yes
	IV.C1.RP-39	3.1-1, 031	Isolation condenser components	Steel; stainless steel	Reactor coolant	Loss of material due to general (steel only), pitting, crevice corrosion, wear	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C1.R-450	3.1-1, 134	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	IV.C1.R-406	3.1-1, 110	Piping, piping components	Metallic	Reactor Coolant	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	IV.C1.R-452a	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	IV.C1.R-452b	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	IV.C1.R-452c	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	IV.C1.R-452d	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C1.R-431	3.1-1, 124	Piping, piping components	Steel	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	IV.C1.R-23	3.1-1, 060	Piping, piping components	Steel	Reactor coolant	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	IV.C1.R-21	3.1-1, 097	Piping, piping components greater than or equal to 4 NPS	Nickel alloy	Reactor coolant	Cracking due to SCC, IGSCC	AMP XI.M7, "BWR Stress Corrosion Cracking," and AMP XI.M2, "Water Chemistry"	No
-	IV.C1.R-20	3.1-1, 097	Piping, piping components greater than or equal to 4 NPS	Stainless steel	Reactor coolant	Cracking due to SCC, IGSCC	AMP XI.M7, "BWR Stress Corrosion Cracking," and AMP XI.M2, "Water Chemistry"	No
-	IV.C1.R-432	3.1-1, 129	Piping, piping components: Welded connection between the re-routed control rod drive return line and the inlet piping system that delivers return line flow to the reactor pressure vessel	Steel; stainless steel	Reactor coolant	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C1.RP-44	3.1-1, 011	Pump and valve closure bolting	Steel, stainless steel	System temperature up to 288°C (550°F)	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.C1.RP-158	3.1-1, 079	Reactor coolant pressure boundary components	Steel (with stainless steel or nickel alloy cladding), stainless steel, nickel alloy	Reactor coolant	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	IV.C1.R-220	3.1-1, 006	Reactor coolant pressure boundary components: piping, piping components; other pressure retaining components with fatigue analyses	Stainless steel, steel (with or without nickel alloy or stainless steel cladding), nickel alloy	Reactor coolant	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
N	IV.C1.R-456	3.1-1, 140	Piping, piping components	Steel, stainless steel, nickel alloy	Reactor Coolant	Cracking due to thermal fatigue	Plant-specific aging management program	Yes
D	IV.C1.R-429	-	-	-	-	-	-	-
D	IV.C1.R-451	-	-	-	-	-	-	-
D	IV.C1.R-452	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; CASS = cast austenitic stainless steel; IGSCC = intergranular stress corrosion cracking; NPS = nominal pipe size; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

C2 REACTOR COOLANT SYSTEM AND CONNECTED LINES (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the pressurized water reactor primary coolant pressure boundary, which consists of the RCS and portions of other connected systems generally extending up to and including the second containment isolation valve or to the first anchor point and including the containment isolation valves, the reactor coolant pump, valves, pressurizer, and the pressurizer relief tank. The connected systems include the residual heat removal or low pressure injection system, high pressure injection system, sampling system, and the small-bore piping. With respect to other systems such as the core flood system or the safety injection tank and the chemical and volume control system (CVCS), the isolation valves associated with the boundary between American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Classes 1 and 2 are located inside the containment. Based on Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," and with the exception of the pressurizer relief tank, which is governed by Group B Quality Standards, all systems, structures and components that compose the RCS are governed by Group A Quality Standards. The recirculating pump seal water heat exchanger is discussed in V.D1.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the reactor coolant pressure boundary include the reactor pressure vessel (IV.A2), the steam generators (IV.D1 and IV.D2), the emergency core cooling system (V.D1), and the CVCS (VII.E1).

Table C.2 Reactor Coolant System and Connected Lines (PWR)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.RP-235	3.1-1, 039	Class 1 piping, fittings and branch connections < nominal pipe size 4	Stainless steel, steel (with or without nickel alloy or stainless steel cladding), nickel alloy	Reactor coolant	Cracking due to stress corrosion cracking (SCC; for stainless steel or nickel alloy surfaces exposed to reactor coolant only), intergranular stress corrosion cracking (IGSCC; for stainless steel or nickel alloy surfaces exposed to reactor coolant only), thermal, mechanical, vibratory loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," AMP XI.M2, "Water Chemistry," and XI.M35, "ASME Code Class 1 Small-bore Piping"	No
M	IV.C2.R-05	3.1-1, 020	Class 1 piping, piping components	Cast austenitic stainless steel	Reactor coolant	Cracking due to SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
-	IV.C2.RP-344	3.1-1, 033	Class 1 piping, piping components	Stainless steel, steel with stainless steel cladding	Reactor coolant	Cracking due to SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.R-52	3.1-1, 050	Class 1 piping, piping components, including pump casings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
-	IV.C2.R-09	3.1-1, 033	Class 1 pump casings; valve bodies	Stainless steel, steel with stainless steel cladding	Reactor coolant	Cracking due to SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
-	IV.C2.R-08	3.1-1, 038	Class 1 valve bodies and bonnets	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.C2.R-11	3.1-1, 062	Closure bolting	High-strength steel, stainless steel	Air – indoor uncontrolled	Cracking due to SCC	AMP XI.M18, "Bolting Integrity"	No
-	IV.C2.RP-167	3.1-1, 049	Closure bolting	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	IV.C2.RP-166	3.1-1, 064	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled	Loss of material due to general (steel only), pitting, crevice corrosion, wear	AMP XI.M18, "Bolting Integrity"	No
-	IV.C2.R-12	3.1-1, 066	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.RP-380	3.1-1, 048	External surfaces: reactor coolant pressure boundary piping or components adjacent to dissimilar metal (Alloy 82/182) welds	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No
-	IV.C2.R-450	3.1-1, 134	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	IV.C2.R-18	3.1-1, 005	Piping and components; bolting	Steel; stainless steel	System temperature up to 340°C (644°F)	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.C2.RP-222	3.1-1, 090	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	IV.C2.RP-12	3.1-1, 093	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.RP-159	3.1-1, 045	Piping, piping components	Nickel alloy	Reactor coolant, steam	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No
-	IV.C2.R-452a	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	IV.C2.R-452b	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.R-452c	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	IV.C2.R-452d	3.1-1, 136	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	IV.C2.R-431	3.1-1, 124	Piping, piping components	Steel	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	IV.C2.RP-221	3.1-1, 089	Piping, piping components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	IV.C2.R-17	3.1-1, 049	Piping, piping components: external surfaces	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.RP-23	3.1-1, 088	Piping, piping components; flanges; heater sheaths and sleeves; penetrations; thermal sleeves; non-reactor vessel shells, heads, nozzles, nozzle safe ends; welds	Steel (with stainless steel or nickel alloy cladding), stainless steel, nickel alloy	Reactor coolant	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry"	No
-	IV.C2.R-58	3.1-1, 040	Pressurizer components	Steel (with stainless steel or nickel alloy cladding); stainless steel	Reactor coolant	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.C2.R-25	3.1-1, 042	Pressurizer components	Steel (with stainless steel or nickel alloy cladding); stainless steel	Reactor coolant	Cracking due to SCC, primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
-	IV.C2.R-217	3.1-1, 033	Pressurizer heater sheaths and sleeves; heater bundle diaphragm plate	Stainless steel	Reactor coolant	Cracking due to SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.RP-37	3.1-1, 045	Pressurizer instrumentation penetrations; heater sheaths and sleeves; heater bundle diaphragm plate; manways and flanges	Nickel alloy, steel with nickel alloy cladding	Reactor coolant	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No
-	IV.C2.RP-231	3.1-1, 034	Pressurizer relief tank: tank shell and heads; flanges; nozzles	Stainless steel, steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
-	IV.C2.R-13	3.1-1, 005	Pressurizer relief tank: tank shell and heads; flanges; nozzles	Steel (with stainless steel or nickel alloy cladding)	Treated borated water	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.RP-383	3.1-1, 080	Pressurizer relief tank: tank shell and heads; flanges; nozzles (non-ASME Section XI components)	Stainless steel, steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
N	IV.C2.R-456	3.1-1, 140	Piping, piping components	Steel, stainless steel, nickel alloy	Reactor Coolant	Cracking due to thermal fatigue	Plant-specific aging management program	Yes
-	IV.C2.RP-156	3.1-1, 045	Pressurizer surge and steam space nozzles; welds	Nickel alloy	Reactor coolant, steam	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.R-19	3.1-1, 036	Pressurizer: integral support	Steel; stainless steel	Any	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.C2.RP-40	3.1-1, 082	Pressurizer: spray head	Nickel alloy	Reactor coolant	Cracking due to SCC, primary water SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	IV.C2.RP-41	3.1-1, 081	Pressurizer: spray head	Stainless Steel	Reactor coolant	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	IV.C2.RP-44	3.1-1, 011	Pump and valve closure bolting	Steel, stainless steel	System temperature up to 288°C (550°F)	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.C2.R-223	3.1-1, 009	Reactor coolant pressure boundary components: piping, piping components; other pressure retaining components with fatigue analyses	Stainless steel, steel (with or without nickel alloy or stainless steel cladding), nickel alloy	Reactor coolant	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.C2.R-56	3.1-1, 035	Reactor coolant system piping and fittings: cold leg; hot leg; surge line; spray line	Stainless steel, steel with stainless steel cladding	Reactor coolant	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.C2.R-456	3.1-1, 140	Piping, piping components	Steel, stainless steel, nickel alloy	Reactor Coolant	Cracking due to thermal fatigue	Plant-specific aging management program	Yes
M	IV.A2.R-457	3.1-1, 141	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes
D	IV.C2.R-30	-	-	-	-	-	-	-
D	IV.C2.R-429	-	-	-	-	-	-	-
D	IV.C2.R-448	-	-	-	-	-	-	-
D	IV.C2.R-451	-	-	-	-	-	-	-
D	IV.C2.R-452	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; IGSCC = intergranular stress corrosion cracking; MIC = microbiologically influenced corrosion; PWR = pressurized water reactor; RCPB = reactor coolant pressure boundary; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

D STEAM GENERATOR

D1 STEAM GENERATOR (RECIRCULATING)

Systems, Structures, and Components

This section addresses the recirculating-type steam generators (SGs), as found in Westinghouse and Combustion Engineering pressurized water reactor, including all internal components and water/steam nozzles and safe ends. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the primary water side (tube side) of the SG is governed by Group A Quality Standards, and the secondary water side is governed by Group B Quality Standards.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the SGs include the reactor coolant system and connected lines (IV.C2), the containment isolation components (V.C), the main steam system (VIII.B1), the feedwater system (VIII.D1), the SG blowdown system (VIII.F), and the auxiliary feedwater system (VIII.G).

Table D.1 Steam Generator (Recirculating)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D1.R-10	3.1-1, 062	Closure bolting	High-strength steel	Air – indoor uncontrolled	Cracking due to stress corrosion cracking (SCC)	AMP XI.M18, "Bolting Integrity"	No
-	IV.D1.RP-166	3.1-1, 064	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled	Loss of material due to general (steel only), pitting, crevice corrosion, wear	AMP XI.M18, "Bolting Integrity"	No
-	IV.D1.RP-46	3.1-1, 067	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No
-	IV.D1.RP-36	3.1-1, 045	Instrument penetrations and primary side nozzles; safe ends; welds	Steel (with nickel alloy cladding), nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D1.R-450	3.1-1, 134	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	IV.D1.R-37	3.1-1, 061	Pressure boundary and structural: steam nozzle and safe end; feedwater nozzle and safe end	Steel	Secondary feedwater or steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	IV.D1.RP-17	3.1-1, 086	Primary side components: divider plate	Stainless steel	Reactor coolant	Cracking due to SCC	AMP XI.M2, "Water Chemistry"	No
M	IV.D1.RP-367	3.1-1, 025	Primary side components: divider plate	Steel (with nickel alloy cladding), nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators." In addition, use of the One-Time Inspection program is to be evaluated.	Yes
-	IV.D1.R-17	3.1-1, 049	Recirculating steam generator components: external surfaces	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D1.R-221	3.1-1, 008	Recirculating steam generator components: flanges; penetrations; nozzles; safe ends; lower heads; welds	Stainless steel, steel (with or without nickel alloy or stainless steel cladding), nickel alloy	Reactor coolant	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.D1.R-31	3.1-1, 044	Secondary manway and handhole covers: cover seating surfaces	Steel	Treated water, steam	Loss of material due to erosion	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	IV.D1.R-436	3.1-1, 127	Steam generator channel heads and tubesheets	Steel (with stainless steel or nickel alloy cladding)	Reactor coolant	Loss of material due to boric acid corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators"	No
-	IV.D1.RP-372	3.1-1, 083	Steam generator components: shell assembly	Steel	Secondary feedwater or steam	Loss of material due to general, pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D1.R-33	3.1-1, 005	Steam generator components: top head; steam nozzle and safe end; upper and lower shell; feedwater (FW) and auxiliary FW nozzle and safe end; FW impingement plate and support	Steel	Secondary feedwater or steam	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.D1.RP-368	3.1-1, 012	Steam generator components: upper and lower shell; transition cone; new transition cone closure weld	Steel	Secondary FW or steam	Loss of material due to general, pitting, crevice corrosion	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	Yes
-	IV.D1.R-39	3.1-1, 022	Steam generator FW impingement plate and support	Steel	Secondary FW	Loss of material due to erosion	Plant-specific aging management program	Yes
-	IV.D1.RP-48	3.1-1, 075	Steam generator structural: tube support lattice bars	Steel	Secondary FW or steam	Wall thinning due to flow-accelerated corrosion, general corrosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.R-42	3.1-1, 072	Steam generator structural: tube support plates	Steel	Secondary feedwater or steam	Ligament cracking due to corrosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D1.RP-384	3.1-1, 071	Steam generator structural: U-bend supports including anti-vibration bars	Steel; chrome plated steel, stainless steel, nickel alloy	Secondary FW or steam	Cracking due to SCC or other mechanism(s)	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.RP-225	3.1-1, 076	Steam generator structural: U-bend supports including anti-vibration bars	Steel; chrome plated steel, stainless steel, nickel alloy	Secondary FW or steam	Loss of material due to fretting, wear	AMP XI.M19, "Steam Generators"	No
-	IV.D1.RP-226	3.1-1, 071	Steam generator structural: U-bend supports including anti-vibration bars	Steel; chrome plated steel, stainless steel, nickel alloy	Secondary FW or steam	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.RP-232	3.1-1, 033	Steam generator: primary nozzles; nozzle-to-safe end welds; manways; flanges	Stainless steel, steel with stainless steel cladding	Reactor coolant	Cracking due to SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.RP-161	3.1-1, 072	Steam generator: Tube bundle wrapper and associated supports and mounting hardware	Steel	Secondary FW or steam	Loss of material due to general, pitting, crevice corrosion, erosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry" (general, pitting, crevice corrosion only)	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D1.R-40	3.1-1, 070	Tube plugs	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.R-43	3.1-1, 068	Tubes	Nickel alloy	Secondary FW or steam	Changes in dimension ("denting") due to corrosion of carbon steel tube support plate	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.R-407	3.1-1, 111	Tubes	Nickel alloy	Secondary FW or steam	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators"	No
-	IV.D1.R-437	3.1-1, 125	Tubes (at tube support plate locations)	Nickel alloy	Secondary FW or steam	Cracking due to flow-induced vibration, high-cycle fatigue	AMP XI.M19, "Steam Generators"	No
-	IV.D1.R-50	3.1-1, 073	Tubes and sleeves	Nickel alloy	Phosphate chemistry in secondary FW or steam	Loss of material due to wastage, pitting corrosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.R-44	3.1-1, 070	Tubes and sleeves	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.R-46	3.1-1, 002	Tubes and sleeves	Nickel alloy	Reactor coolant, secondary FW/steam	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D1.R-47	3.1-1, 069	Tubes and sleeves	Nickel alloy	Secondary FW or steam	Cracking due to outer diameter SCC, intergranular attack	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D1.RP-233	3.1-1, 077	Tubes and sleeves	Nickel alloy	Secondary FW or steam	Loss of material due to fretting, wear	AMP XI.M19, "Steam Generators"	No
M	IV.D1.RP-385	3.1-1, 025	Tube-to-tube sheet welds	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators." In addition, use of the One-Time Inspection program is to be evaluated.	Yes
-	IV.D1.RP-49	3.1-1, 074	Upper assembly and separators including: feedwater inlet ring and support	Steel	Secondary FW or steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
D	IV.D1.R-448	-	-	-	-	-	-	-
D	IV.D1.R-48	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; CASS = cast austenitic stainless steel; FW = feedwater; PWR = pressurized water reactor; RCPB = reactor coolant pressure boundary; SCC = stress corrosion cracking; SRM = source range monitor; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

D2 STEAM GENERATOR (ONCE-THROUGH)

Systems, Structures, and Components

This section addresses the once-through type SGs, as found in Babcock & Wilcox pressurized water reactors, including all internal components and water/steam nozzles and safe ends. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the primary water side (tube side) of the SG is governed by Group A Quality Standards, and the secondary water side is governed by Group B Quality Standards.

Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in IV.E.

System Interfaces

The systems that interface with the SGs include the reactor coolant system and connected lines (IV.C2), the main steam system (VIII.B1), the feedwater system (VIII.D1), the SG blowdown system (VIII.F), and the auxiliary feedwater system (VIII.G).

Table D.2 Steam Generator (Once-Through)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D2.R-10	3.1-1, 062	Closure bolting	High-strength steel	Air – indoor uncontrolled	Cracking due to stress corrosion cracking (SCC)	AMP XI.M18, "Bolting Integrity"	No
-	IV.D2.RP-166	3.1-1, 064	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled	Loss of material due to general (steel only), pitting, crevice corrosion, wear	AMP XI.M18, "Bolting Integrity"	No
-	IV.D2.RP-46	3.1-1, 067	Closure bolting	Steel, stainless steel	Air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No
-	IV.D2.RP-36	3.1-1, 045	Instrument penetrations and primary side nozzles; safe ends; welds	Steel (with nickel alloy cladding), nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry," and AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in RCPB Components (PWRs Only)"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
--	IV.D2.R-450	3.1-1, 134	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
	IV.D2.R-17	3.1-1, 049	Once-through steam generator components: external surfaces	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	IV.D2.R-222	3.1-1, 008	Once-through steam generator components: primary side nozzles, safe ends, welds	Stainless steel, steel (with or without nickel alloy or stainless steel cladding), nickel alloy	Reactor coolant	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	IV.D2.RP-47	3.1-1, 042	Primary side components: upper and lower heads, and tube sheet welds	Steel (with stainless steel or nickel alloy cladding)	Reactor coolant	Cracking due to SCC, primary water SCC	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," and AMP XI.M2, "Water Chemistry"	No
-	IV.D2.R-31	3.1-1, 044	Secondary manway and handhole covers: cover seating surfaces	Steel	Treated water, steam	Loss of material due to erosion	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D2.R-36	3.1-1, 078	Steam generator components: secondary side nozzles (vent, drain, and instrumentation)	Nickel alloy	Secondary feedwater or steam	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection," or AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD."	No
-	IV.D2.R-38	3.1-1, 061	Steam generator components: feedwater (FW) and auxiliary FW nozzles and safe ends; steam nozzles and safe ends	Steel	Secondary FW or steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	IV.D2.RP-153	3.1-1, 083	Steam generator components: shell assembly	Steel	Secondary FW or steam	Loss of material due to general, pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	IV.D2.R-33	3.1-1, 005	Steam generator components: top head; steam nozzle and safe end; upper and lower shell; FW and auxiliary FW nozzle and safe end; FW impingement plate and support	Steel	Secondary feedwater or steam	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D2.R-42	3.1-1, 072	Steam generator structural: tube support plates	Steel	Secondary FW or steam	Ligament cracking due to corrosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D2.R-440	3.1-1, 127	Steam Generator upper and lower heads and tubesheets	Steel (with stainless steel or nickel alloy cladding)	Reactor coolant	Loss of material due to boric acid corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators"	No
-	IV.D2.RP-162	3.1-1, 072	Steam generator: tube bundle wrapper and associated supports and mounting hardware	Steel	Secondary FW or steam	Loss of material due to general, pitting, crevice corrosion, erosion	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry" (general, pitting, crevice corrosion only)	No
-	IV.D2.R-40	3.1-1, 070	Tube plugs	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D2.R-226	3.1-1, 068	Tubes	Nickel alloy	Secondary FW or steam	Changes in dimension ("denting") due to corrosion of carbon steel tube support plate	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D2.R-407	3.1-1, 111	Tubes	Nickel alloy	Secondary FW or steam	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators"	No
-	IV.D2.R-442	3.1-1, 125	Tubes (at tube support plate locations)	Nickel alloy	Secondary FW or steam	Cracking due to flow-induced vibration, high-cycle fatigue	AMP XI.M19, "Steam Generators"	No
-	IV.D2.R-44	3.1-1, 070	Tubes and sleeves	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M19, "Steam Generators," and AMP XI.M2, "Water Chemistry"	No
-	IV.D2.R-46	3.1-1, 002	Tubes and sleeves	Nickel alloy	Reactor coolant, secondary FW steam	Cumulative fatigue damage: cracking due to fatigue, cyclic loading	TLAA, SRP-SLR Section 4.3 “Metal Fatigue”	Yes
-	IV.D2.R-47	3.1-1, 069	Tubes and sleeves	Nickel alloy	Secondary FW or steam	Cracking due to outer diameter SCC, intergranular attack	AMP XI.M19, “Steam Generators,” and AMP XI.M2, “Water Chemistry”	No
-	IV.D2.RP-233	3.1-1, 077	Tubes and sleeves	Nickel alloy	Secondary FW or steam	Loss of material due to fretting, wear	AMP XI.M19, “Steam Generators”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.D2.RP-185	3.1-1, 025	Tube-to-tube sheet welds	Nickel alloy	Reactor coolant	Cracking due to primary water SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M19, "Steam Generators." In addition, use of the One-Time Inspection program is to be evaluated.	Yes
D	IV.D2.R-448	-	-	-	-	-	-	-
D	IV.D2.R-48	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; FW = feedwater; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

E COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

Systems, Structures, and Components

This section addresses the aging management programs (AMPs) for miscellaneous material/environment combinations, which may be found throughout the reactor vessel, internals, and reactor coolant systems, structures, and components. For the material/environment combinations in this part, aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation. With the exception of components within the scope of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, or for those for which a further evaluation results in identifying aging effects and a corresponding AMP, no AMPs for these structures and components are required.

System Interfaces

The structures and components covered in this section belong to the engineered safety features in pressurized water reactors and boiling water reactors. (For example, see System Interfaces in V.A to V.D2 for details.)

Table E.1 Common Miscellaneous Material/Environmental Combinations

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	IV.E.R-453	3.1-1, 137	Piping, piping components	Copper alloy	Air, condensation, gas	None	None	No
-	IV.E.RP-378	3.1-1, 106	Piping, piping components	Nickel alloy	Air with borated water leakage	None	None	No
-	IV.E.RP-05	3.1-1, 107	Piping, piping components	Stainless steel	Air with borated water leakage	None	None	No
-	IV.E.RP-06	3.1-1, 115	Piping, piping components	Stainless steel	Concrete	None	None	Yes
-	IV.E.RP-07	3.1-1, 107	Piping, piping components	Stainless steel	Gas	None	None	No
-	IV.E.RP-353	3.1-1, 105	Piping, piping components	Steel	Concrete	None	None	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	IV.E.R-444	3.1-1, 114	Reactor coolant system components: Components defined as ASME Section XI components (e.g., ASME Code Class 1 reactor coolant pressure boundary components, reactor interior attachments, or core support structure components, ASME Class 2 or 3 components, including associated pressure-retaining welds) not managed by other aging management review line items in GALL-SLR Chapter IV	Any	Applicable internal or external environment	Cracking due to stress corrosion cracking (SCC), intergranular SCC (IGSCC; stainless steel or nickel alloy components only), cyclic loading; loss of material due to general corrosion (steel only), pitting corrosion, crevice corrosion, wear	AMP XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” and AMP XI.M2, “Water Chemistry” (water chemistry-related or corrosion-related aging effect mechanisms only)	No
D	IV.E.RP-03	-	-	-	--	-	-	-
D	IV.E.RP-04	-	-	-	-	-	-	--

AMP = aging management program; ASME = American Society of Mechanical Engineers; GALL-SLR = Generic Aging Lessons Learned for Subsequent License Renewal Report; IGSCC = intergranular stress corrosion cracking; SCC = stress corrosion cracking;SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

CHAPTER V

ENGINEERED SAFETY FEATURES

V ENGINEERED SAFETY FEATURES

A. CONTAINMENT SPRAY SYSTEM (PRESSURIZED WATER REACTOR)

B. STANDBY GAS TREATMENT SYSTEM (BOILING WATER REACTOR)

C. CONTAINMENT ISOLATION COMPONENTS

D1. EMERGENCY CORE COOLING SYSTEM (PRESSURIZED WATER REACTOR)

D2. EMERGENCY CORE COOLING SYSTEM (BOILING WATER REACTOR)

E. EXTERNAL SURFACES OF COMPONENTS AND MISCELLANEOUS BOLTING

F. COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

A CONTAINMENT SPRAY SYSTEM (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the containment spray system for pressurized water reactors (PWRs) designed to lower the pressure, temperature, and gaseous radioactivity (iodine) content of the containment atmosphere following a design basis event. Spray systems that use chemically treated borated water are reviewed. The system consists of piping and valves, including containment isolation valves, flow elements, orifices, pumps, spray nozzles, eductors, and the containment spray system heat exchanger (for some plants).

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the containment spray system outside or inside the containment are governed by Group B Quality Standards.

Pumps and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in V.E. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in V.F.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the containment spray system are the PWR emergency core cooling (V.D1), and open- or closed-cycle cooling water systems (VII.C1 or VII.C2).

Table A.1 Containment Spray System (PWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.E-434	3.2-1, 090	Any	Steel	Treated borated water, treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, “One-Time Inspection”	No
-	V.A.EP-42	3.2-1, 045	Encapsulation components	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	V.A.EP-43	3.2-1, 047	Encapsulation components	Steel	Air with borated water leakage	Loss of material due to general, pitting, crevice, and boric acid corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	V.A.EP-94	3.2-1, 032	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, “Closed Treated Water Systems”	No
-	V.A.EP-37	3.2-1, 034	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, “Selective Leaching”	No
-	V.A.EP-93	3.2-1, 031	Heat exchanger components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, “Closed Treated Water Systems”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.EP-91	3.2-1, 025	Heat exchanger components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, “Open-Cycle Cooling Water System”	No
-	V.A.EP-92	3.2-1, 030	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, “Closed Treated Water Systems”	No
-	V.A.E-473	3.2-1, 130	Heat exchanger components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, “Lubricating Oil Analysis,” and AMP XI.M32, “One-Time Inspection”	No
-	V.A.EP-90	3.2-1, 023	Heat exchanger components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, “Open-Cycle Cooling Water System”	No
-	V.A.EP-100	3.2-1, 033	Heat exchanger tubes	Copper alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, “Closed Treated Water Systems”	No
-	V.A.EP-78	3.2-1, 051	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, “Lubricating Oil Analysis,” and AMP XI.M32, “One-Time Inspection”	No
-	V.A.EP-96	3.2-1, 033	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, “Closed Treated Water Systems”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.EP-79	3.2-1, 051	Heat exchanger tubes	Stainless steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, “Lubricating Oil Analysis,” and AMP XI.M32, “One-Time Inspection”	No
-	V.A.E-21	3.2-1, 027	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, “Open-Cycle Cooling Water System”	No
M	V.A.E-20	3.2-1, 019	Heat exchanger tubes	Stainless steel, nickel alloy	Treated borated water	Reduction of heat transfer due to fouling	AMP XI.M2, “Water Chemistry,” and AMP XI.M32, “One-Time Inspection”	No
-	V.A.EP-75	3.2-1, 051	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, “Lubricating Oil Analysis,” and AMP XI.M32, “One-Time Inspection”	No
-	V.A.E-460	3.2-1, 117	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to stress corrosion cracking (SCC);reduction of heat transfer due to fouling	AMP XI.M21A, “Closed Treated Water Systems”	No
-	V.A.E-458	3.2-1, 115	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC; reduction of heat transfer due to fouling	AMP XI.M2, “Water Chemistry,” and AMP XI.M32, “One-Time Inspection”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	V.A.E-475	3.2-1, 132	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC, flow blockage due to fouling.	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.A.E-43	3.2-1, 035	Motor cooler	Gray cast iron	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	V.A.EP-3c	3.2-1, 056	Piping, piping components	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.A.E-443c	3.2-1, 100	Piping, piping components	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.A.E-474	3.2-1, 131	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.A.EP-97	3.2-1, 032	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.EP-76	3.2-1, 050	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, “Lubricating Oil Analysis,” and AMP XI.M32, “One-Time Inspection”	No
-	V.A.EP-27	3.2-1, 034	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, “Selective Leaching”	No
-	V.A.EP-103c	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, “External Surfaces Monitoring of Mechanical Components”	Yes
-	V.A.EP-103d	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	Yes
-	V.A.EP-95	3.2-1, 031	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, “Closed Treated Water Systems”	No
-	V.A.EP-98	3.2-1, 028	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, “Closed Treated Water Systems”	No
-	V.A.EP-81c	3.2-1, 048	Piping, piping components	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.E-29	3.2-1, 044	Piping, piping components	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.A.EP-77	3.2-1, 049	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
M	V.A.E-415	3.2-1, 074	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, treated borated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.A.EP-81b	3.2-1, 048	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.A.EP-81d	3.2-1, 048	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.E-477b	3.2-1, 134	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
N	V.A.E-478	3.2-1, 134	Piping	CFRP	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
-	V.A.E-428	3.2-1, 022	Piping, piping components, heat exchanger components	Nickel alloy	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.EP-41	3.2-1, 022	Piping, piping components, heat exchanger components, tanks	Stainless steel	Treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	V.A.E-401	3.2-1, 072	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated borated water, lubricating oil	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.A.E-414	3.2-1, 073	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated borated water, lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.A.E-466	3.2-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.E-427	3.2-1, 043	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.A.EP-3b	3.2-1, 056	Piping, piping components, tanks	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.A.EP-3d	3.2-1, 056	Piping, piping components, tanks	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.A.E-443b	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.A.E-443d	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.E-400	3.2-1, 066	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.A.EP-103b	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.A.EP-103e	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.A.E-12	3.2-1, 020	Piping, piping components, tanks	Stainless steel, steel (with stainless steel or nickel alloy cladding)	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.A.EP-81a	3.2-1, 048	Tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.A.E-404	3.2-1, 070	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel, stainless steel, aluminum	Treated water, treated borated water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
N	V.A.E-457	3.2-1,135	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes
D	V.A.E-26	-	-	-	-	-	-	-
D	V.A.E-28	-	-	-	-	-	-	-
D	V.A.E-403	-	-	-	-	-	-	-
D	V.A.E-406	-	-	-	-	-	-	-
D	V.A.E-420	-	-	-	-	-	-	-
D	V.A.E-421	-	-	-	-	-	-	-
D	V.A.E-435	-	-	-	-	-	-	-
D	V.A.E-443a	-	-	-	-	-	-	-
D	V.A.EP-103a	-	-	-	-	-	-	-
D	V.A.EP-3a	-	-	-	-	-	-	-

AMP = aging management program; ASME = American Society of Mechanical Engineers; CFR = *Code of Federal Regulations*; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

B STANDBY GAS TREATMENT SYSTEM (BOILING WATER REACTOR)

Systems, Structures, and Components

This section addresses the standby gas treatment system found in boiling water reactors (BWRs) that consists of ductwork, filters, and fans. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the standby gas treatment system are governed by Group B Quality Standards.

Specifically, charcoal absorber filters are to be addressed consistent with the U.S. Nuclear Regulatory Commission (NRC) position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of Nuclear Energy Institute, dated March 10, 2000. Components that function as system filters are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, from an aging management review (on a plant-specific basis), under Title 10 of the *Code of Federal Regulations* 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement; for example, National Fire Protection Association standards for fire protection equipment.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in V.E. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in V.F.

System Interfaces

The systems that potentially interface with the standby gas treatment system include the main steam system (boiling water reactor) (VIII.B2) or extraction steam system (VIII. C), as sources of steam for the steam jet air ejector outlets from the main condenser.

Table B.1 Standby Gas Treatment System (BWR)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.B.E-434	3.2-1, 090	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	V.B.E-25	3.2-1, 044	Ducting, ducting components	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.B.EP-37	3.2-1, 034	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	V.B.E-443c	3.2-1, 100	Piping, piping components	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to stress corrosion cracking (SCC)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.B.E-474	3.2-1, 131	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.B.EP-97	3.2-1, 032	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.B.EP-27	3.2-1, 034	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	V.B.EP-54	3.2-1, 037	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	V.B.EP-103c	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.B.EP-103d	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.B.EP-107a	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.B.EP-107b	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.B.EP-107d	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.B.E-457	3.2-1, 114	Piping, piping components	Stainless steel, nickel alloy	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.B.E-27	3.2-1, 046	Piping, piping components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	V.B.E-415	3.2-1, 074	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.B.E-477b	3.2-1, 134	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.B.E-476	3.2-1, 133	Piping, piping components, heat exchanger components	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
M	V.B.E-401	3.2-1, 072	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated water, raw water, lubricating oil	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.B.E-414	3.2-1, 073	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated water, raw water, lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.B.E-466	3.2-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.B.E-427	3.2-1, 043	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.B.EP-58	3.2-1, 043	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.B.E-443b	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.B.E-443d	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.B.E-400	3.2-1, 066	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.B.EP-103b	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.B.EP-103e	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
N	V.B.E-457	3.2-1,135	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	V.B.E-26	-	-	-	-	-	-	-
D	V.B.E-40	-	-	-	-	-	-	-
D	V.B.E-403	-	-	-	-	-	-	-
D	V.B.E-406	-	-	-	-	-	-	-
D	V.B.E-435	-	-	-	-	-	-	-
D	V.B.E-443a	-	-	-	-	-	-	-
D	V.B.EP-103a	-	-	-	-	-	-	-
D	V.B.EP-107c	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

C CONTAINMENT ISOLATION COMPONENTS

Systems, Structures, and Components

This section addresses the containment isolation components found in all designs of BWRs and PWRs in the United States. The system consists of isolation barriers in lines for BWR and PWR nonsafety systems, such as the plant heating, waste gas, plant drain, liquid waste, and cooling water systems. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the containment isolation components are governed by Group A or B Quality Standards.

The aging management programs (AMPs) for hatchways, hatch doors, penetration sleeves, penetration bellows, seals, gaskets, and anchors are addressed in II.A and II.B. The containment isolation valves for in-scope systems are addressed in the appropriate sections in IV, VII, and VIII.

The AMPs for the degradation of external surfaces of components and miscellaneous bolting are included in V.E. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in V.F.

System Interfaces

The system interfaces with the containment isolation components addressed in this section are addressed in the respective portions of the Generic Aging Lessons Learned for Subsequent License Renewal Report associated with the process lines (e.g., closed-cycle cooling water) penetrating containment.

1 **Table C.1 Containment Isolation Components**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.C.E-434	3.2-1, 090	Any	Steel	Treated borated water, treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	V.C.EP-42	3.2-1, 045	Encapsulation components	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.C.EP-43	3.2-1, 047	Encapsulation components	Steel	Air with borated water leakage	Loss of material due to general, pitting, crevice, and boric acid corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.C.EP-103c	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to stress corrosion cracking (SCC)	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.C.EP-103d	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.C.EP-95	3.2-1, 031	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.C.EP-98	3.2-1, 028	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.C.E-34	3.2-1, 024	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.C.EP-63	3.2-1, 022	Piping, piping components	Stainless steel	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.C.EP-107a	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.C.EP-107b	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.C.EP-107d	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.C.E-457	3.2-1, 114	Piping, piping components	Stainless steel, nickel alloy	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.C.EP-99	3.2-1, 029	Piping, piping components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.C.E-22	3.2-1, 023	Piping, piping components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.C.EP-62	3.2-1, 016	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.C.E-09	3.2-1, 011	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	V.C.E-415	3.2-1, 074	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.C.E-476	3.2-1, 133	Piping, piping components, heat exchanger components	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.C.E-401	3.2-1, 072	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated water, raw water, closed-cycle cooling water, treated borated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.C.E-414	3.2-1, 073	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated water, raw water, closed-cycle cooling water, treated borated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.C.E-466	3.2-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.C.E-400	3.2-1, 066	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.C.EP-103b	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.C.EP-103e	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
N	V.C.E-457	3.2-1,135	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes
D	V.C.E-30	-	-	-	-	-	-	-
D	V.C.E-35	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	V.C.E-403	-	-	-	-	-	-	-
D	V.C.E-406	-	-	-	-	-	-	-
D	V.C.EP-103a	-	-	-	-	-	-	-
D	V.C.EP-107c	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

D EMERGENCY CORE COOLING

D1 EMERGENCY CORE COOLING SYSTEM (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the emergency core cooling systems for PWRs designed to cool the reactor core and provide safe shutdown following a design basis accident. The core cooling systems consist of the core flood system, residual heat removal (RHR) (or shutdown cooling), high-pressure safety injection (HPSI), low-pressure safety injection (LPSI), and spent fuel pool (SFP) cooling systems, the lines to the chemical and volume control system (CVCS), the emergency sump, the HPSI and LPSI pumps, the pump seal coolers, the RHR heat exchanger, and the refueling water tank.

Based on Regulatory Guide 1.26, “Quality Group Classifications, and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the emergency core cooling system, are governed by Group B Quality Standards. Portions of the RHR, HPSI, and LPSI systems and the CVCS extending from the reactor coolant system up to and including the second containment isolation valve are governed by Group A Quality Standards and are covered in IV.C2.

Pumps and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in V.E. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VI.F.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the emergency core cooling system include the reactor coolant system and connected lines (IV.C2), the containment spray system (V.A), the SFP cooling and cleanup system (VII.A3), the closed-cycle cooling water system (VII.C2), the ultimate heat sink (VII.C3), the CVCS (VII.E1), and the open-cycle cooling water (service water system) (VII.C1).

1 **Table D.1 Emergency Core Cooling System (PWR)**

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-434	3.2-1, 090	Any	Steel	Treated borated water, treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	V.D1.EP-42	3.2-1, 045	Encapsulation components	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D1.EP-43	3.2-1, 047	Encapsulation components	Steel	Air with borated water leakage	Loss of material due to general, pitting, crevice, and boric acid corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D1.EP-94	3.2-1, 032	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
--	V.D1.EP-37	3.2-1, 034	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
	V.D1.EP-93	3.2-1, 031	Heat exchanger components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.EP-91	3.2-1, 025	Heat exchanger components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
--	V.D1.EP-92	3.2-1, 030	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
	V.D1.E-473	3.2-1, 130	Heat exchanger components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.EP-90	3.2-1, 023	Heat exchanger components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.D1.EP-78	3.2-1, 051	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.EP-96	3.2-1, 033	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D1.EP-79	3.2-1, 051	Heat exchanger tubes	Stainless steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-21	3.2-1, 027	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
M	V.D1.E-20	3.2-1, 019	Heat exchanger tubes	Stainless steel, nickel alloy	Treated borated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.EP-75	3.2-1, 051	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.E-460	3.2-1, 117	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to stress corrosion cracking (SCC); reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D1.E-458	3.2-1, 115	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC; reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	V.D1.E-475	3.2-1, 132	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC; flow blockage due to fouling.	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.D1.E-43	3.2-1, 035	Motor cooler	Gray cast iron	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-24	3.2-1, 005	Orifice (miniflow recirculation when centrifugal high-pressure coolant injection pumps are used for normal charging)	Stainless steel	Treated borated water	Loss of material due to erosion	AMP XI.M32, "One-Time Inspection"	No
-	V.D1.EP-3c	3.2-1, 056	Piping, piping components	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D1.E-443c	3.2-1, 100	Piping, piping components	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D1.E-474	3.2-1, 131	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D1.EP-71	3.2-1, 017	Piping, piping components	Aluminum	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-47	3.2-1, 010	Piping, piping components	Cast austenitic stainless steel	Treated borated water >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
-	V.D1.EP-97	3.2-1, 032	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D1.EP-76	3.2-1, 050	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
--	V.D1.EP-27	3.2-1, 034	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
	V.D1.E-441	3.2-1, 098	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	V.D1.EP-52	3.2-1, 036	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	V.D1.EP-54	3.2-1, 037	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	V.D1.E-407	3.2-1, 065	Piping, piping components	Metallic	Treated borated water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.EP-103c	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.D1.EP-103d	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D1.E-13	3.2-1, 001	Piping, piping components	Stainless steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	V.D1.EP-95	3.2-1, 031	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D1.EP-98	3.2-1, 028	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D1.EP-80	3.2-1, 050	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.EP-55	3.2-1, 024	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.D1.EP-107a	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.EP-107b	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.D1.EP-107d	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.EP-81c	3.2-1, 048	Piping, piping components	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D1.E-27	3.2-1, 046	Piping, piping components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.EP-77	3.2-1, 049	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.E-09	3.2-1, 011	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	V.D1.E-439	3.2-1, 096	Piping, piping components (for components not covered by U.S. Nuclear Regulatory Commission Generic Letters 89-13)	Steel, stainless steel	Raw water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	V.D1.E-415	3.2-1, 074	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, treated borated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.D1.EP-81b	3.2-1, 048	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.EP-81d	3.2-1, 048	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.E-477b	3.2-1, 134	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D1.E-428	3.2-1, 022	Piping, piping components, heat exchanger components	Nickel alloy	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.EP-41	3.2-1, 022	Piping, piping components, heat exchanger components, tanks	Stainless steel	Treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	V.D1.E-401	3.2-1, 072	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated borated water, lubricating oil, condensation	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
M	V.D1.E-414	3.2-1, 073	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated borated water, lubricating oil, condensation	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.D1.E-466	3.2-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D1.E-427	3.2-1, 043	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.EP-3b	3.2-1, 056	Piping, piping components, tanks	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D1.EP-3d	3.2-1, 056	Piping, piping components, tanks	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
--	V.D1.E-443b	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
	V.D1.E-443d	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.E-400	3.2-1, 066	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D1.EP-103b	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.EP-103e	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.E-12	3.2-1, 020	Piping, piping components, tanks	Stainless steel, steel (with stainless steel or nickel alloy cladding)	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.D1.E-472	3.2-1, 129	Tanks	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.D1.EP-81a	3.2-1, 048	Tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.D1.E-448a	3.2-1, 105	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-448b	3.2-1, 105	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D1.E-448c	3.2-1, 105	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.E-445a	3.2-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.D1.E-445b	3.2-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-445c	3.2-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.E-447	3.2-1, 104	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.D1.E-446a	3.2-1, 103	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.D1.E-446b	3.2-1, 103	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-446c	3.2-1, 103	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.E-405	3.2-1, 067	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.D1.E-449a	3.2-1, 106	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.D1.E-449b	3.2-1, 106	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D1.E-449c	3.2-1, 106	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D1.E-402	3.2-1, 068	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel	Soil, concrete, air, condensation	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.D1.E-404	3.2-1, 070	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel, stainless steel, aluminum	Treated water, treated borated water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
N	V.D1.E-457	3.2-1,135	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes
D	V.D1.E-01	-	-	-	-	--		-
D	V.D1.E-24a	-	-	-	-	--		-
D	V.D1.E-28	-	-	-	-	--		-
D	V.D1.E-38	-	-	-	-	--		-
D	V.D1.E-403	-	-	-	-	--		-
D	V.D1.E-406	-	-	-	-	--		-
D	V.D1.E-420	-	-	-	-	--		-

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	V.D1.E-421	-	-	-	-	--		-
D	V.D1.E-435	-	-	-	-	--		-
D	V.D1.E-443a	-	-	-	-	--		-
D	V.D1.EP-101	-	-	-	-	--		-
D	V.D1.EP-103a	-	-	-	-	--		-
D	V.D1.EP-107c	-	-	-	-	--		-
D	V.D1.EP-3a	-	-	-	-	--		-
D	V.D1.EP-49	-	-	-	-	--		-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

D2 EMERGENCY CORE COOLING SYSTEM (BOILING WATER REACTOR)

Systems, Structures, and Components

This section addresses the emergency core cooling systems for BWRs designed to cool the reactor core and provide safe shutdown after a design basis accident. The cooling systems consist of the high-pressure coolant injection (HPCI), reactor core isolation cooling (RCIC), high-pressure core spray, automatic depressurization, low-pressure core spray, low-pressure coolant injection, and RHR systems, including various pumps and valves, the RHR heat exchangers, and the drywell and suppression chamber spray system. The auxiliary area ventilation system includes RCIC, HPCI, RHR, and core spray pump room cooling.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the emergency core cooling system outside the containment are governed by Group B Quality Standards and the portion of the drywell and suppression chamber spray system inside the containment up to the isolation valve is governed by Group A Quality Standards. Portions of the HPCI, RCIC, high-pressure core spray, low-pressure core spray, and low-pressure coolant injection (or RHR) systems extending from the reactor vessel up to and including the second containment isolation valve are governed by Group A Quality Standards and covered in IV.C1.

Pumps and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The system piping includes all pipe sizes, including instrument piping.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in V.E. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VI.F.

System Interfaces

The systems that interface with the emergency core cooling system include the reactor vessel (IV.A1), the reactor coolant pressure boundary (IV.C1), the feedwater system (VIII.D2), the condensate system (VIII.E), the closed-cycle cooling water system (VII.C2), the open-cycle cooling water system (VII.C1), and the ultimate heat sink (VII.C3).

1 **Table D.2 Emergency Core Cooling System (BWR)**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-434	3.2-1, 090	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	V.D2.EP-113a	3.2-1, 006	Drywell and suppression chamber spray system (internal surfaces): flow orifice; spray nozzles	Metallic	Air – indoor uncontrolled, condensation	Loss of material due to general, pitting, crevice corrosion; flow blockage due to fouling	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.EP-113b	3.2-1, 006	Drywell and suppression chamber spray system (internal surfaces): flow orifice; spray nozzles	Metallic	Air – indoor uncontrolled, condensation	Loss of material due to general, pitting, crevice corrosion; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D2.EP-94	3.2-1, 032	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D2.EP-37	3.2-1, 034	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	V.D2.EP-93	3.2-1, 031	Heat exchanger components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.EP-91	3.2-1, 025	Heat exchanger components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.D2.EP-92	3.2-1, 030	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D2.E-473	3.2-1, 130	Heat exchanger components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.EP-90	3.2-1, 023	Heat exchanger components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.D2.EP-78	3.2-1, 051	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.EP-96	3.2-1, 033	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D2.EP-79	3.2-1, 051	Heat exchanger tubes	Stainless steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-21	3.2-1, 027	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
M	V.D2.EP-74	3.2-1, 019	Heat exchanger tubes	Stainless steel, nickel alloy	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.EP-75	3.2-1, 051	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.E-23	3.2-1, 027	Heat exchanger tubes	Steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	V.D2.E-460	3.2-1, 117	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to stress corrosion cracking (SCC);reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D2.E-458	3.2-1, 115	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC; reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	V.D2.E-475	3.2-1, 132	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	SCC; flow blockage due to fouling.	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.EP-3c	3.2-1, 056	Piping, piping components	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D2.E-443c	3.2-1, 100	Piping, piping components	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D2.E-474	3.2-1, 131	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D2.EP-71	3.2-1, 017	Piping, piping components	Aluminum	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.E-11	3.2-1, 010	Piping, piping components	Cast austenitic stainless steel	Treated water >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	AMP XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.EP-97	3.2-1, 032	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D2.EP-76	3.2-1, 050	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.EP-27	3.2-1, 034	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water, treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	V.D2.E-441	3.2-1, 098	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	V.D2.EP-54	3.2-1, 037	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	V.D2.E-408	3.2-1, 065	Piping, Piping components	Metallic	Treated water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	V.D2.EP-103c	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.D2.EP-103d	3.2-1, 007	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.EP-95	3.2-1, 031	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D2.EP-98	3.2-1, 028	Piping, piping components	Stainless steel		Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	V.D2.EP-107a	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.EP-107b	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.D2.EP-107d	3.2-1, 004	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-457	3.2-1, 114	Piping, piping components	Stainless steel, nickel alloy	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-29	3.2-1, 044	Piping, piping components	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D2.E-10	3.2-1, 001	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	V.D2.E-27	3.2-1, 046	Piping, piping components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D2.EP-77	3.2-1, 049	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.E-07	3.2-1, 011	Piping, piping components	Steel	Steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	V.D2.EP-60	3.2-1, 016	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-09	3.2-1, 011	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	V.D2.E-440	3.2-1, 096	Piping, piping components (for components not covered by U.S. Nuclear Regulatory Commission Generic Letters 89-13)	Steel, stainless steel	Raw water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D2.E-37	3.2-1, 054	Piping, piping components greater than or equal to 4 nominal pipe size	Stainless steel, nickel alloy	Treated water >93°C (>200°F)	Cracking due to SCC, intergranular SCC	AMP XI.M7, "BWR Stress Corrosion Cracking," and AMP XI.M2, "Water Chemistry"	No
M	V.D2.E-415	3.2-1, 074	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	V.D2.EP-61b	3.2-1, 048	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.EP-61c	3.2-1, 048	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D2.EP-61d	3.2-1, 048	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-477b	3.2-1, 134	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D2.E-428	3.2-1, 022	Piping, piping components, heat exchanger components	Nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.EP-73	3.2-1, 022	Piping, piping components, heat exchanger components	Stainless steel	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	V.D2.E-476	3.2-1, 133	Piping, piping components, heat exchanger components	Titanium	Raw water	SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
M	V.D2.E-401	3.2-1, 072	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated water, lubricating oil, condensation	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
M	V.D2.E-414	3.2-1, 073	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated water, lubricating oil, condensation	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-466	3.2-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D2.E-427	3.2-1, 043	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	V.D2.EP-3b	3.2-1, 056	Piping, piping components, tanks	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.EP-3d	3.2-1, 056	Piping, piping components, tanks	Aluminum	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-443b	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-443d	3.2-1, 100	Piping, piping components, tanks	Aluminum	Air, condensation (internal), raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-400	3.2-1, 066	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.D2.EP-103b	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.EP-103e	3.2-1, 007	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-472	3.2-1, 129	Tanks	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.EP-61a	3.2-1, 048	Tanks	Stainless steel, nickel alloy	Air, condensation (internal)	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.D2.E-448a	3.2-1, 105	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.D2.E-448b	3.2-1, 105	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.E-448c	3.2-1, 105	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-445a	3.2-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-445b	3.2-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.E-445c	3.2-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-447	3.2-1, 104	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.D2.E-446a	3.2-1, 103	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-446b	3.2-1, 103	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.E-446c	3.2-1, 103	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-405	3.2-1, 067	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.D2.E-449a	3.2-1, 106	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.D2.E-449b	3.2-1, 106	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.D2.E-449c	3.2-1, 106	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.D2.E-402	3.2-1, 068	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel	Soil, concrete, air, condensation	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.D2.E-404	3.2-1, 070	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel, stainless steel, aluminum	Treated water, treated borated water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
N	V.D2.E-457	3.2-1,135	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	V.D2.E-26	-	-	-	-	-	-	-
D	V.D2.E-403	-	-	-	-	-	-	-
D	V.D2.E-406	-	-	-	-	-	-	-
D	V.D2.E-420	-	-	-	-	-	-	-
D	V.D2.E-421	-	-	-	-	-	-	-
D	V.D2.E-435	-	-	-	-	-	-	-
D	V.D2.E-443a	-	-	-	-	-	-	-
D	V.D2.EP-103a	-	-	-	-	-	-	-
D	V.D2.EP-107c	-	-	-	-	-	-	-
D	V.D2.EP-3a	-	-	-	-	-	-	-
D	V.D2.EP-72	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

E EXTERNAL SURFACES OF COMPONENTS AND MISCELLANEOUS BOLTING

Systems, Structures, and Components

This section addresses the AMPs for the degradation of external surfaces of structures and components, including closure bolting in the engineered safety features in PWRs and BWRs. For the steel components in PWRs, this section addresses only boric acid corrosion of external surfaces as a result of dripping borated water leaking from an adjacent PWR component. Boric acid corrosion can also occur for steel components containing borated water leaking from an adjacent PWR component. Boric acid corrosion can also occur for steel components containing borated water due to leakage; such components and the related AMP are covered in the appropriate major plant sections in V.

System Interfaces

The structures and components covered in this section belong to the engineered safety features in PWRs and BWRs. (For example, see System Interfaces in V.A to V.D2 for details.)

Table E.1 External Surfaces of Components and Miscellaneous Bolting

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-03	3.2-1, 012	Closure bolting	High-strength steel	Air, soil, underground	Cracking due to stress corrosion cracking (SCC); cyclic loading	AMP XI.M18, "Bolting Integrity"	No
-	V.E.EP-116	3.2-1, 015	Closure bolting	Metallic	Any, soil, underground	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No
-	V.E.E-421	3.2-1, 079	Closure bolting	Stainless steel	Air, soil, concrete, underground	Cracking due to SCC	AMP XI.M18, "Bolting Integrity"	No
-	V.E.E-418	3.2-1, 076	Closure bolting	Stainless steel, steel, nickel alloy, copper alloy	Treated water, treated borated water, raw water, waste water, lubricating oil	Loss of material due to general, pitting, crevice corrosion, microbially influenced corrosion (MIC) (steel, copper alloy in raw water, waste water only)	AMP XI.M18, "Bolting Integrity"	No
-	V.E.E-468	3.2-1, 125	Closure bolting	Steel	Soil, concrete, underground	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	V.E.E-02	3.2-1, 014	Closure bolting	Steel, stainless steel, nickel alloy	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M18, "Bolting Integrity"	No
-	V.E.E-44	3.2-1, 040	External surfaces	Steel	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-28	3.2-1, 009	External surfaces	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	V.E.E-424	3.2-1, 081	Heat exchanger tubes	Stainless steel, steel, aluminum, copper alloy, titanium	Air, condensation	Reduction of heat transfer due to fouling	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	V.E.E-452b	3.2-1, 109	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-452c	3.2-1, 109	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.E.E-452d	3.2-1, 109	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-462b	3.2-1, 119	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-462c	3.2-1, 119	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-462d	3.2-1, 119	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-406	3.2-1, 071	Insulated piping, piping components, tanks	Copper alloy (>15% Zn or >8% Al)	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	V.E.E-451b	3.2-1, 108	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-451c	3.2-1, 108	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.E.E-451d	3.2-1, 108	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
--	V.E.E-450b	3.2-1, 107	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
	V.E.E-450c	3.2-1, 107	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.E.E-450d	3.2-1, 107	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-403a	3.2-1, 069	Insulated piping, piping components, tanks	Steel	Air, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	V.E.E-452a	3.2-1, 109	Insulated tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.E.E-462a	3.2-1, 119	Insulated tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-451a	3.2-1, 108	Insulated tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.E.E-450a	3.2-1, 107	Insulated tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.E.E-403b	3.2-1, 069	Insulated tanks (within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks")	Steel	Air, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	V.E.E-422	3.2-1, 087	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	V.E.E-444c	3.2-1, 101	Piping, piping components	Aluminum	Air, condensation (external)	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.E.EP-114c	3.2-1, 042	Piping, piping components	Aluminum	Air, condensation (external)	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-471	3.2-1, 128	Piping, piping components	Copper alloy	Soil, underground	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	V.E.EP-38	3.2-1, 008	Piping, piping components	Copper alloy (>15% Zn)	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	V.E.EP-111	3.2-1, 052	Piping, piping components	Steel	Soil, concrete	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	V.E.EP-123	3.2-1, 052	Piping, piping components	Steel	Underground	Loss of material due to general, pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	V.E.E-477a	3.2-1, 134	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	V.E.E-465	3.2-1, 122	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.EP-59	3.2-1, 038	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	V.E.E-444b	3.2-1, 101	Piping, piping components, tanks	Aluminum	Air, condensation (external)	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-444d	3.2-1, 101	Piping, piping components, tanks	Aluminum	Air, condensation (external)	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.EP-114b	3.2-1, 042	Piping, piping components, tanks	Aluminum	Air, condensation (external)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.EP-114d	3.2-1, 042	Piping, piping components, tanks	Aluminum	Air, condensation (external)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-464b	3.2-1, 121	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-464c	3.2-1, 121	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.E.E-464d	3.2-1, 121	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-463	3.2-1, 120	Piping, piping components, tanks	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	V.E.E-453a	3.2-1, 110	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-453b	3.2-1, 110	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-453c	3.2-1, 110	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-454a	3.2-1, 111	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-454b	3.2-1, 111	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	V.E.E-454c	3.2-1, 111	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-423a	3.2-1, 080	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-423b	3.2-1, 080	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-423c	3.2-1, 080	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.EP-72	3.2-1, 053	Piping, piping components, tanks	Stainless steel, nickel alloy	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	V.E.E-455a	3.2-1, 112	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	V.E.E-455b	3.2-1, 112	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	V.E.E-455c	3.2-1, 112	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-420	3.2-1, 078	Piping, piping components, tanks	Stainless steel, steel, aluminum	Soil, concrete	Cracking due to SCC (steel in carbonate/ bicarbonate environment only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.E.E-469	3.2-1, 126	Piping, piping components, tanks, closure bolting	Titanium, super austenitic	Soil, concrete, underground	Loss of material due to pitting, crevice corrosion, MIC (except for titanium; soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	V.E.E-464a	3.2-1, 121	Tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	V.E.E-442b	3.2-1, 099	Tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	V.E.E-442c	3.2-1, 099	Tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	V.E.E-442d	3.2-1, 099	Tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	V.E.E-442a	3.2-1, 099	Tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	V.E.E-457	3.2-1,135	Piping and piping components with reflective metal insulation	Steel, stainless steel, nickel alloy	Air	Loss of material due to wear	Plant-specific or existing aging management program if loss of material is not mitigated	Yes
D	V.E.E-41	-	--		--		-	-
D	V.E.E-416	-	--		--		-	-
D	V.E.E-417	-	--		--		-	-
D	V.E.E-419	-	--		--		-	-
D	V.E.E-426	-	--		--		-	-
D	V.E.E-429	-	--		--		-	-
D	V.E.E-430	-	--		--		-	-
D	V.E.E-431	-	--		--		-	-
D	V.E.E-433	-	--		--		-	-
D	V.E.E-444a	-	--		--		-	-
D	V.E.E-45	-	--		--		-	-
D	V.E.E-456	-	--		--		-	-
D	V.E.E-46	-	--		--		-	-
D	V.E.EP-114a	-	--		--		-	-
D	V.E.EP-117	-	--		--		-	-
D	V.E.EP-118	-	--		--		-	-
D	V.E.EP-119	-	--		--		-	-
D	V.E.EP-120	-	--		--		-	-
D	V.E.EP-121	-	--		--		-	-
D	V.E.EP-122	-	--		--		-	-
D	V.E.EP-64	-	--		--		-	-
D	V.E.EP-69	-	--		--		-	-
D	V.E.EP-70	-	--		--		-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

F COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

Systems, Structures, and Components

This section addresses the AMPs for miscellaneous material/environment combinations that may be found throughout the emergency safety feature system's structures and components (SCs). For the material/environment combinations in this part, aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation. With the exception of components within the scope of American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, or for those for which a further evaluation results in identifying aging effects and a corresponding AMP, no AMPs for these SCs are required.

System Interfaces

The SCs covered in this section belong to the engineered safety features in pressurized water reactors and boiling water reactor. (For example, see System Interfaces in V.A to V.D2 for details.)

Table F.1 Common Miscellaneous Material/Environment Combinations

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.F.EP-14	3.2-1, 059	Ducting, ducting components, piping, piping components	Galvanized steel	Air – indoor controlled	None	None	No
-	V.F.EP-65	3.2-1, 060	Piping elements	Glass	Air with borated water leakage	None	None	No
-	V.F.EP-15	3.2-1, 060	Piping elements	Glass	Air, underground	None	None	No
-	V.F.EP-68	3.2-1, 060	Piping elements	Glass	Closed-cycle cooling water	None	None	No
-	V.F.EP-66	3.2-1, 060	Piping elements	Glass	Condensation	None	None	No
-	V.F.EP-67	3.2-1, 060	Piping elements	Glass	Gas	None	None	No
-	V.F.EP-16	3.2-1, 060	Piping elements	Glass	Lubricating oil	None	None	No
-	V.F.EP-28	3.2-1, 060	Piping elements	Glass	Raw water	None	None	No
-	V.F.EP-30	3.2-1, 060	Piping elements	Glass	Treated borated water	None	None	No
--	V.F.EP-29	3.2-1, 060	Piping elements	Glass	Treated water	None	None	No
-	V.F.EP-10	3.2-1, 057	Piping, piping components	Copper alloy	Air, condensation, gas	None	None	No
-	V.F.E-470	3.2-1, 127	Piping, piping components	Copper alloy	Concrete	None	None	No
-	V.F.EP-12	3.2-1, 058	Piping, piping components	Copper alloy, copper alloy (>8% Al)	Air with borated water leakage	None	None	No
-	V.F.EP-115	3.2-1, 062	Piping, piping components	Nickel alloy	Air with borated water leakage	None	None	No
-	V.F.EP-19	3.2-1, 063	Piping, piping components	Stainless steel	Air with borated water leakage	None	None	No
-	V.F.EP-20	3.2-1, 091	Piping, piping components	Stainless steel	Concrete	None	None	Yes
-	V.F.EP-22	3.2-1, 063	Piping, piping components	Stainless steel	Gas	None	None	No
-	V.F.EP-4	3.2-1, 064	Piping, piping components	Steel	Air – indoor controlled	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	V.F.EP-112	3.2-1, 055	Piping, piping components	Steel	Concrete	None	None	Yes
-	V.F.EP-7	3.2-1, 064	Piping, piping components	Steel	Gas	None	None	No
-	V.F.E-461	3.2-1, 118	Piping, piping components, heat exchanger components other than tubes	Titanium (ASTM Grades 1, 2, 7, 9, 11, or 12)	Closed-cycle cooling water	None	None	No
-	V.F.E-459	3.2-1, 116	Piping, piping components, heat exchanger components other than tubes	Titanium (ASTM Grades 1, 2, 7, 9, 11, or 12)	Treated water	None	None	No
-	V.F.E-467	3.2-1, 124	Piping, piping components, tanks	Aluminum	Air with borated water leakage	None	None	No
D	V.F.E-438	-	-	-	-	-	-	-
D	V.F.EP-17	-	-	-	-	-	-	-
D	V.F.EP-18	-	-	-	-	-	-	-
D	V.F.EP-3a	-	-	-	-	-	-	-
D	V.F.EP-3b	-	-	-	-	-	-	-
D	V.F.EP-3c	-	-	-	-	-	-	-
D	V.F.EP-3d	-	-	-	-	-	-	-
D	V.F.EP-82	-	-	-	-	-	-	-
D	V.F.EP-87	-	-	-	-	-	-	-
D	V.F.EP-9	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

CHAPTER VI

ELECTRICAL COMPONENTS

VI ELECTRICAL COMPONENTS

A. EQUIPMENT NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

B. EQUIPMENT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

A EQUIPMENT NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Systems, Structures, and Components

This section addresses electrical cables and connections that are not subject to the environmental qualification (EQ) requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.49 and that are installed in power and instrumentation and control applications. The power, control and instrumentation cables and connections addressed are low-voltage (i.e., typical operating voltage of less than 1,000 V—but no greater than 2 kV and medium-voltage [2 kV to 35 kV]). High-voltage (>35 kV) power cables and connections have unique, specialized constructions and must be evaluated on a plant-specific basis.

This section also addresses components that are relied upon to meet the station blackout (SBO) requirements for restoration of offsite power. The offsite power system relied upon in the plant-specific current licensing basis (CLB) for compliance with 10 CFR 50.63, that connects the plant to the offsite power source, is included in the SBO restoration equipment scope. The electrical distribution equipment out to the first circuit breaker with the offsite distribution system (i.e., equipment in the switchyard) is included within the SBO restoration equipment scope of license renewal. This path typically includes the circuit breakers that connect to the offsite system power transformers (startup transformers), the transformers themselves, the intervening overhead or underground circuits between the circuit breaker and transformer and the transformer onsite electrical distribution system, and the associated control circuits and structures. However, the staff's review is based on the plant-specific CLB, regulatory requirements, and offsite power design configurations.

Electrical cables and their required terminations (i.e., connections) are typically reviewed as a single commodity. The types of connections included in this review are splices, mechanical connectors, fuse holders, and terminal blocks. This common review is translated into program actions, which treat cables and connections in the same manner.

Electrical cables and connections that are in the plant’s EQ program are addressed in VI.B.

System Interfaces

Electrical cables and connections functionally interface with all plant systems that rely on electric power or instrumentation and control. Electrical cables and connections also interface with and are supported by structural commodities (e.g., cable trays, conduit, cable trenches, cable troughs, duct banks, cable vaults, and manholes) that are reviewed, as appropriate, in the systems, structures, and components section.

1 **Table A.1 Equipment Not Subject to 10 CFR 50.49 Environmental Qualification Requirements**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.L-11	3.6-1, 029	Cable Bus	Electrical insulation; insulators	Air – indoor controlled or uncontrolled, air – outdoor	Reduced electrical insulation resistance due to degradation caused thermal/ thermoxidative degradation of organics and photolysis (ultraviolet [UV]-sensitive materials only) of organics, moisture/debris intrusion and ohmic heating	A plant-specific aging management program is to be evaluated	Yes
-	VI.A.L-09	3.6-1, 027	Cable Bus: external surface of enclosure assemblies	Galvanized steel; aluminum	Air – indoor controlled or uncontrolled	None	None	No
-	VI.A.L-13	3.6-1, 031	Cable Bus: external surface of enclosure assemblies	Galvanized steel; aluminum	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated	Yes
-	VI.A.L-14	3.6-1, 032	Cable Bus: external surface of enclosure assemblies	Steel	Air – indoor controlled	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.L-12	3.6-1, 030	Cable Bus: external surface of enclosure assemblies	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated	Yes
-	VI.A.LP-30	3.6-1, 019	Cable connections (metallic parts)	Various metals used for electrical contacts	Air – indoor controlled or uncontrolled, air – outdoor	Increased electrical resistance of connection due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, oxidation	AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-35b	3.6-1, 010	Electrical conductor insulation for inaccessible instrumentation and control cables (e.g., installed in duct bank, buried conduit or direct buried)	Various organic polymers such as ethylene propylene rubber (EPR), Silicone Rubber (SR), Ethylene Propylene Diene Monomer (EPDM), Cross Linked Polyethylene (XLPE), butyl rubber, and combined thermo-plastic jacket/ insulation shield	Adverse localized environment caused by significant moisture	Reduced electrical insulation resistance or degraded dielectric strength due to significant moisture	AMP XI.E3B, "Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-35c	3.6-1, 010	Electrical conductor insulation for inaccessible low-voltage cables - typical operating voltage of < 1 kV but no greater than 2 kV (e.g., installed in duct bank, buried conduit or direct buried)	Various organic polymers such as EPR, SR, EPDM, XLPE, butyl rubber, and combined thermo-plastic jacket/ insulation shield	Adverse localized environment caused by significant moisture	Reduced electrical insulation resistance or degraded dielectric strength due to significant moisture	AMP XI.E3C, "Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements"	No
-	VI.A.LP-35a	3.6-1, 010	Electrical conductor insulation for inaccessible medium-voltage cables -typical operating range of 2 kV to 35 kV (e.g., installed in duct bank, buried conduit or direct buried)	Various organic polymers such as EPR, SR, EPDM, XLPE, butyl rubber, and combined thermo-plastic jacket/ insulation shield	Adverse localized environment caused by significant moisture	Reduced electrical insulation resistance or degraded dielectric strength due to significant moisture	AMP XI.E3A, "Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements"	No
-	VI.A.LP-36	3.6-1, 020	Electrical connector contacts for electrical connectors	Various metals used for electrical contacts	Air with borated water leakage	Increased electrical resistance of connection due to corrosion of connector contact surfaces caused by intrusion of borated water	AMP XI.M10, "Boric Acid Corrosion"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-33	3.6-1, 008	Electrical insulation for electrical cables and connections (including terminal blocks, etc.)	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture	Reduced electrical insulation resistance due to thermal/ thermoxidative degradation of organics, radiolysis, and photolysis (UV-sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	AMP XI.E1, "Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No
-	VI.A.LP-34	3.6-1, 009	Electrical insulation for electrical cables and connections used in instrumentation circuits that are sensitive to reduction in conductor electrical insulation resistance (IR)	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture	Reduced electrical insulation resistance due to thermal/ thermoxidative degradation of organics, radiolysis, and photolysis (UV-sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	AMP XI.E2, "Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-24	3.6-1, 022	Fuse holders (not part of active equipment): electrical insulation	Electrical insulation: bakelite; phenolic melamine or ceramic; molded poly-carbonate; other	Air – indoor controlled or uncontrolled	Reduced electrical insulation resistance due to thermal/ thermoxidative degradation of organics, radiolysis, and photolysis (UV-sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	AMP XI.E5, "Fuse Holders" No aging management program is required for those applicants who can demonstrate these fuse holders are located in an environment that does not subject them to environmental aging mechanisms.	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-31	3.6-1, 018	Fuse holders (not part of active equipment): metallic clamps	Various metals used for electrical connections	Air – indoor controlled or uncontrolled	Increased electrical resistance of connection due to fatigue caused by frequent fuse removal/ manipulation or vibration	AMP XI.E5, "Fuse Holders" No aging management program is required for those applicants who can demonstrate these fuse holders are located in an environment that does not subject them to environmental aging mechanisms and effects including fatigue caused by frequent fuse removal/ manipulation or vibration.	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.L-07	3.6-1, 017	Fuse holders (not part of active equipment): metallic clamps	Various metals used for electrical connections	Air – indoor controlled or uncontrolled	Increased electrical resistance of connection due to fatigue due to ohmic heating, thermal cycling, electrical transients	AMP XI.E5, "Fuse Holders" No aging management program is required for those applicants who can demonstrate these fuse holders are not subject to fatigue due to ohmic heating, thermal cycling, electrical transients.	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-23	3.6-1, 016	Fuse holders (not part of active equipment): metallic clamps	Various metals used for electrical connections	Air – indoor uncontrolled	Increased electrical resistance of connection due to chemical contamination, corrosion, and oxidation (in an air, indoor controlled environment, increased resistance of connection due to chemical contamination, corrosion and oxidation do not apply)	AMP XI.E5, "Fuse Holders" No aging management program is required for those applicants who can demonstrate these fuse holders are located in an environment that does not subject them to environmental aging mechanisms and effects due to chemical contamination, corrosion, and oxidation.	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VI.A.LP-32	3.6-1, 002	High-voltage electrical insulators	Porcelain; malleable iron; aluminum; galvanized steel; cement; toughened glass; polymers silicone rubber; fiberglass, aluminum alloy	Air – outdoor	Loss of material due to mechanical wear or corrosion caused by movement of transmission conductors due to significant wind	AMP XI.E7, "High-Voltage Insulators"	No
M	VI.A.LP-28	3.6-1, 003	High-voltage electrical insulators	Porcelain; malleable iron; aluminum; galvanized steel; cement; toughened glass; polymers silicone rubber; fiberglass, aluminum alloy	Air – outdoor	Reduced electrical insulation resistance due to presence of cracks, foreign debris, salt, dust, cooling tower plume or industrial effluent contamination; peeling of silicone rubber sleeves for polymer insulators; or glazing degradation for porcelain insulators	AMP XI.E7, "High-Voltage Insulators"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-25	3.6-1, 012	Metal enclosed bus: bus/connections	Various metals used for electrical bus and connections	Air – indoor controlled or uncontrolled, air – outdoor	Increased electrical resistance of connection due to the loosening of bolts caused by thermal cycling and ohmic heating	AMP XI.E4, "Metal Enclosed Bus"	No
-	VI.A.LP-26	3.6-1, 013	Metal enclosed bus: electrical insulation; electrical insulators	Porcelain; xenoy; thermo-plastic organic polymers	Air – indoor controlled or uncontrolled, air – outdoor	Reduced electrical insulation resistance due to thermal/ thermoxidative degradation of organics/ thermoplastics, radiation-induced oxidation, moisture/debris intrusion, ohmic heating	AMP XI.E4, "Metal Enclosed Bus"	No
-	VI.A.LP-29	3.6-1, 011	Metal enclosed bus: enclosure assemblies	Elastomer	Air – indoor controlled or uncontrolled, air – outdoor	Surface cracking, crazing, scuffing, dimensional change (e.g., "ballooning" and "necking"), shrinkage, discoloration, hardening, loss of strength due to elastomer degradation	AMP XI.E4, "Metal Enclosed Bus," or AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-41	3.6-1, 023	Metal enclosed bus: external surface of enclosure assemblies	Galvanized steel; aluminum	Air – indoor controlled or uncontrolled	None	None	No
-	VI.A.LP-42	3.6-1, 015	Metal enclosed bus: external surface of enclosure assemblies	Galvanized steel; aluminum	Air – outdoor	Loss of material due to pitting, crevice corrosion	AMP XI.E4, "Metal Enclosed Bus," or AMP XI.S6, "Structures Monitoring"	No
-	VI.A.LP-44	3.6-1, 024	Metal enclosed bus: external surface of enclosure assemblies	Steel	Air – indoor controlled	None	None	No
-	VI.A.LP-43	3.6-1, 014	Metal enclosed bus: external surface of enclosure assemblies	Steel	Air – indoor uncontrolled, air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.E4, "Metal Enclosed Bus," or AMP XI.S6, "Structures Monitoring"	No
-	VI.A.LP-39	3.6-1, 006	Switchyard bus and connections	Aluminum; copper; bronze; stainless steel; galvanized steel	Air – outdoor	Loss of material due to wind-induced abrasion; Increased resistance of connection due to oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated	Yes
-	VI.A.LP-46	3.6-1, 021	Transmission conductors	Aluminum	Air – outdoor	Loss of conductor strength due to corrosion	None - for Aluminum Conductor Alloy Reinforced (ACAR) and All Aluminum Conductor (AAC)	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.A.LP-38	3.6-1, 004	Transmission conductors	Aluminum; steel	Air – outdoor	Loss of conductor strength due to corrosion	A plant-specific aging management program is to be evaluated for aluminum conductor steel-reinforced (ACSR)	Yes
-	VI.A.LP-47	3.6-1, 007	Transmission conductors	Aluminum; Steel	Air – outdoor	Loss of material due to wind-induced abrasion	A plant-specific aging management program is to be evaluated for AAC, ACAR, and ACSR	Yes
-	VI.A.LP-48	3.6-1, 005	Transmission connectors	Aluminum; steel	Air – outdoor	Increased resistance of connection due to oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated	Yes
D	VI.A.L-08	-	-	-	-	-	-	-
D	VI.A.L-10	-	-	-	-	-	-	-

AAC = Aluminum Conductor; ACAR = aluminum conductor steel-reinforced; ACSR = aluminum conductor steel-reinforced; AMP = aging management program; CASS = cast austenitic stainless steel; CFR = *Code of Federal Regulations*; EPDM = Ethylene Propylene Diene Monomer; EPR = ethylene propylene rubber; IR = insulation resistance; SR = Silicone Rubber; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis; UV = ultraviolet; XLPE = Cross Linked Polyethylene.

B EQUIPMENT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

Systems, Structures, and Components

The U.S. Nuclear Regulatory Commission has established nuclear station EQ requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 Appendix A, Criterion 4, and in 10 CFR 50.49. As required by 10 CFR 50.49, an EQ program is established to demonstrate that certain electrical components located in harsh plant environments (i.e., those areas of the plant that could be subject to the harsh environmental effects of a loss of coolant accident, high-energy line breaks, or post- loss of coolant accident radiation) are qualified to perform their safety function in those harsh environments after the effects of inservice aging. As required by 10 CFR 50.49, the effects of significant aging mechanisms are addressed as part of EQ. Components in the EQ program have a qualified life, and the components are replaced at the end of that qualified life if it is shorter than the current operating term. The qualified life may be extended by methods such as refurbishment, reanalysis, or through ongoing qualification, but the licensee is required by the EQ regulation (10 CFR 50.49) to replace the component when its qualified life has expired.

Similarly, some nuclear power plants have mechanical equipment that was qualified in accordance with the provisions of Criterion 4 of Appendix A to 10 CFR Part 50.

System Interfaces

Equipment subject to 10 CFR 50.49 EQ requirements could functionally interface with all plant systems that rely on electric power or instrumentation and control.

Table B.1 Equipment Subject to 10 CFR 50.49 Environmental Qualification Requirements

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VI.B.L-05	3.6-1, 001	Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Various polymeric and metallic materials	Areas of the plant that could be subject to harsh environmental effects of a loss of coolant accident (LOCA), high energy line break, or post LOCA environment Adverse localized environment (e.g., temperature, radiation, or moisture)	Various aging effects due to various mechanisms in accordance with 10 *Code of Federal Regulations* (CFR) 50.49	EQ is a TLAA to be evaluated for the subsequent period of extended operation. See the Standard Review Plan, Section 4.4, "Environment Qualification (EQ) of Electric Equipment," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii). See AMP X.E1, "Environmental Qualification (EQ) of Electric Equipment," of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii).	Yes

AMP = aging management program; CFR = *Code of Federal Regulations*; EQ = environmental qualification; LOCA = loss of coolant accident; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

CHAPTER VII

AUXILIARY SYSTEMS

VII AUXILIARY SYSTEMS

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A2. SPENT FUEL STORAGE
A3. SPENT FUEL POOL COOLING AND CLEANUP (PRESSURIZED WATER REACTOR)
A4. SPENT FUEL POOL COOLING AND CLEANUP (BOILING WATER REACTOR)
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I. EXTERNAL SURFACES OF COMPONENTS AND MISCELLANEOUS BOLTING

J. COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

A NEW AND SPENT FUEL STORAGE, COOLING, AND CLEANUP

A1 NEW FUEL STORAGE

Systems, Structures, and Components

This section discusses the structures and components used for new fuel storage that include carbon steel new fuel storage racks located in the auxiliary building or the fuel handling building. The racks are exposed to the temperature and humidity in the auxiliary building. The racks are generally painted with a protective coating. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components used for new fuel storage are governed by Group C Quality Standards.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

System Interfaces

No other systems discussed in this report interface with those used for new fuel storage.

Table A.1 New Fuel Storage

New, Modified Deleted, Edited Item	Item	Standard Review Plan Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program/Time-Limited Aging Analysis	Further Evaluation
-	VII.A1.A-94	3.3-1, 111	Structural steel	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	Aging Management Program XI.S6, "Structures Monitoring"	No

A2 SPENT FUEL STORAGE

Systems, Structures, and Components

This section discusses the structures and components used for spent fuel storage and includes stainless steel spent fuel storage racks (typically made of stainless steel) and neutron-absorbing materials (e.g., Boraflex, Boral®, or boron-steel sheets, if used) submerged in chemically treated oxygenated boiling water reactor or borated pressurized water reactor water. The intended function of a spent fuel rack is to separate spent fuel assemblies. Neutron absorber sheets fastened to the storage cells provide for neutron absorption and help maintain subcriticality of spent fuel assemblies in the spent fuel pool.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components used for spent fuel storage are governed by Group C Quality Standards. In some plants, the Boraflex has been replaced by metallic-based absorber materials.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

No other systems discussed in this report interface with those used for spent fuel storage.

Table A.2 Spent Fuel Storage

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A2.AP-79	3.3-1, 125	Piping, piping components	Stainless steel, steel with stainless steel cladding, nickel alloy	Treated borated water	Loss of material due to pitting, crevice corrosion, micro-bially influenced corrosion (MIC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A2.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.A2.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.A2.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A2.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.A2.A-98	3.3-1, 125	Spent fuel storage racks (boiling water reactor [BWR])	Stainless steel	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A2.A-96	3.3-1, 124	Spent fuel storage racks (BWR)	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A2.A-99	3.3-1, 125	Spent fuel storage racks (pressurized water reactor [PWR])	Stainless steel	Treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A2.A-97	3.3-1, 124	Spent fuel storage racks (PWR)	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A2.A-87	3.3-1, 051	Spent fuel storage racks: neutron-absorbing sheets (BWR)	Boraflex	Treated water	Reduction of neutron-absorbing capacity due to boraflex degradation	AMP XI.M22, "Boraflex Monitoring"	No
-	VII.A2.AP-236	3.3-1, 102	Spent fuel storage racks: neutron-absorbing sheets (BWR)	Boral®; boron steel, and other materials (excluding Boraflex)	Treated water	Reduction of neutron-absorbing capacity; change in dimensions and loss of material due to effects of SFP environment	AMP XI.M40, "Monitoring of Neutron-Absorbing Materials other than Boraflex"	No
-	VII.A2.A-86	3.3-1, 051	Spent fuel storage racks: neutron-absorbing sheets (PWR)	Boraflex	Treated borated water	Reduction of neutron-absorbing capacity due to boraflex degradation	AMP XI.M22, "Boraflex Monitoring"	No
-	VII.A2.AP-235	3.3-1, 102	Spent fuel storage racks: neutron-absorbing sheets (PWR)	Boral®; boron steel, and other materials (excluding Boraflex)	Treated borated water	Reduction of neutron-absorbing capacity; change in dimensions and loss of material due to effects of spent fuel pool environment	AMP XI.M40, "Monitoring of Neutron-Absorbing Materials other than Boraflex"	No
D	VII.A2.A-400	-	-	-	-	-	-	-
D	VII.A2.A-405	-	-	-	-	-	-	-
D	VII.A2.A-414	-	-	-	-	-	-	-
D	VII.A2.A-416	-	-	-	-	-	-	-
D	VII.A2.A-749	-	-	-	-	-	-	-

AAC = Aluminum Conductor; AMP = aging management program; BWR = boiling water reactor; CASS = cast austenitic stainless steel; CFR = *Code of Federal Regulations*; IR = insulation resistance; MIC = microbiologically influenced corrosion; PWR = pressurized water reactor; SCC = stress corrosion cracking; SR = Silicone Rubber; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A3 SPENT FUEL POOL COOLING AND CLEANUP (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section discusses the pressurized water reactor (PWR) spent fuel pool (SFP) cooling and cleanup system, which consists of piping, valves, heat exchangers, filters, linings, demineralizers, and pumps. The system contains borated water. The system removes heat from the SFP and transfers heat to the closed-cycle cooling water (CCCW) system, which in turn transfers heat to the open-cycle cooling water (OCCW) system. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that composse the PWR SFP cooling and cleanup system are governed by Group C Quality Standards.

Filtersare to be addressed consistent with the U.S. Nuclear Regulatory Commission (NRC) position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* (10 CFR) 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to 10 CFR 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the PWR spent fuel cooling and cleanup system are the PWR emergency core cooling system (V.D1), the closed-cycle cooling water (CCCW) system (VII.C2), and the PWR chemical and volume control system (VII.E1).

Table A.3 Spent Fuel Pool Cooling and Cleanup (PWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/ Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A3.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.A3.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.A3.A-101	3.3-1, 017	Heat exchanger tubes	Stainless steel	Treated borated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A3.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to stress corrosion cracking (SCC); reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A3.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.A3.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/ Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A3.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.A3.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.A3.AP-79	3.3-1, 125	Piping, piping components	Stainless steel, steel with stainless steel cladding, nickel alloy	Treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A3.A-56	3.3-1, 124	Piping, piping components	Steel (with stainless steel or nickel alloy cladding)	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A3.AP-100	3.3-1, 085	Piping, piping components, seals	Elastomer	Treated borated water	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.A3.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/ Time-Limited Aging Analysis (TLAA)	Further Evaluation
--	VII.A3.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
	VII.A3.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.A3.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VII.A3.A-400	-	-	--		-	-	-
D	VII.A3.A-405	-	-	--		-	-	-
D	VII.A3.A-414	-	-	--		-	-	-
D	VII.A3.A-416	-	-	--		-	-	-
D	VII.A3.A-749	-	-	--		-	-	-
D	VII.A3.A-79	-	-	--		-	-	-
D	VII.A3.A-790a	-	-	--		-	-	-
D	VII.A3.A-790b	-	-	--		-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A4 SPENT FUEL POOL COOLING AND CLEANUP (BOILING WATER REACTOR)

Systems, Structures, and Components

This section discusses the BWR SFP cooling and cleanup system, which consists of piping, valves, heat exchangers, filters, linings, demineralizers, and pumps. The system contains chemically treated oxygenated water. The system removes heat from the SFP and transfers the heat to the CCCW system, which in turn transfers the heat to the OCCW system. Based on Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components that compose the BWR SFP cooling and cleanup system are governed by Group C Quality Standards.

With respect to filters, these items are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* (10 CFR) 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to 10 CFR 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the BWR spent fuel cooling and cleanup system are the CCCW system (VII.C2) and the condensate system (VIII.E).

Table A.4 Spent Fuel Pool Cooling and Cleanup (BWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A4.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.A4.AP-111	3.3-1, 203	Heat exchanger components	Stainless steel, steel with stainless steel cladding, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A4.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.A4.AP-139	3.3-1, 017	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A4.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to stress corrosion cracking (SCC);reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A4.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.A4.AP-130	3.3-1, 025	Piping, piping components	Aluminum	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A4.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.A4.AP-140	3.3-1, 022	Piping, piping components	Copper alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A4.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.A4.AP-32	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.A4.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.A4.AP-110	3.3-1, 203	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A4.AP-108	3.3-1, 026	Piping, piping components	Steel (with stainless steel cladding)	Treated water	Loss of material due to general (only after cladding degradation), pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.A4.AP-101	3.3-1, 085	Piping, piping components, seals	Elastomer	Treated water	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.A4.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A4.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.A4.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.A4.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.A4.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.A4.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.A4.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.A4.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VII.A4.A-400	-	-	-	-	-	-	-
D	VII.A4.A-405	-	-	-	-	-	-	-
D	VII.A4.A-414	-	-	-	-	-	-	-
D	VII.A4.A-416	-	-	-	-	-	-	-
D	VII.A4.A-749	-	-	-	-	-	-	-
D	VII.A4.A-790a	-	-	-	-	-	-	-
D	VII.A4.A-790b	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

A5 SUPPRESSION POOL CLEANUP SYSTEM (BOILING WATER REACTOR)

Systems, Structures, and Components

This section discusses the suppression pool cleanup system, which maintains water quality in the suppression pool in BWRs. The components of this system include piping, filters, valves, and pumps. These components are fabricated of carbon, low-alloy, or austenitic stainless steel. Based on Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," the components that compose the suppression pool cleanup system are governed by the same Group C Quality Standards Group as the corresponding components in the SFP cooling and cleanup system (VII.A4).

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs (AMPs) for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The system that interfaces with the suppression pool cleanup system is the BWR containments (II.B), or BWR emergency core cooling system (V.D2).

Evaluation Summary

There are no tables associated with this section because the suppression pool cleanup system in BWRs is similar to the SFP cooling and cleanup system (VII.A4), and the components in the two systems are identical or very similar. Therefore, the reader is referred to the section for the spent fuel storage pool system for a list of aging effects, aging mechanisms, and AMPs that are to be applied to the suppression pool cleanup system components. (The only component in VII.A4 that may not be applicable to the suppression pool cleanup system is the heat exchanger [aging management review line-items VII.A4.AP-111, VII.A4.4AP-139, VII.A4.AP-189]).

B OVERHEAD HEAVY LOAD AND LIGHT LOAD (RELATED TO REFUELING) HANDLING SYSTEMS

Systems, Structures, and Components

Most commercial nuclear facilities have between 50 and 100 cranes. Many of these cranes are industrial-grade cranes that must meet the requirements of Title 29 of the *Code of Federal Regulations* (29 CFR) Volume XVII, Part 1910, and Section 1910.179. They do not fall within the scope of 10 CFR 54.4 and therefore are not required to be part of the integrated plant assessment. Normally fewer than 10 cranes fall within the scope of 10 CFR 54.4. These cranes must comply with the requirements provided in 10 CFR 50.65 and Regulatory Guide 1.160 for monitoring the effectiveness of maintenance at nuclear power plants.

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (the Program) must demonstrate that the testing and the monitoring of the maintenance programs have been completed to ensure that the structures, systems, and components of these cranes are capable of sustaining their rated loads during the period of extended operation. Note that many of the structures and components of these cranes can be classified as moving parts or as components that change configuration, or they may be subject to replacement based on a qualified life. In any of these cases, they will not fall within the scope of this aging management review. The primary components that this program is concerned with are the structural girders and beams that make up the bridge and the trolley.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

System Interfaces

No other systems discussed in this report interface with the overhead heavy load and light load (related to refueling) handling systems. Physical interfaces exist with the supporting structure. The direct interface is at the connection to the structure.

Table B.1 Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.B.A-06	3.3-1, 001	Cranes: bridges, structural members, structural components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.7, "Other Plant-Specific TLAAs"	Yes
-	VII.B.A-07	3.3-1, 052	Cranes: rails, bridges, structural members, structural components	Steel	Air	Loss of material due to general corrosion, wear, deformation, cracking	AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
-	VII.B.A-730	3.3-1, 199	Cranes: structural bolting	Steel	Air	Loss of preload due to self-loosening; loss of material due to general corrosion; cracking	AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
D	VII.B.A-05	-	-	-	-	-	-	-
D	VII.B.A-731	-	-	-	-	-	-	-

AMP = aging management program; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

C CYCLE COOLING WATER

C1 OPEN-CYCLE COOLING WATER SYSTEM (SERVICE WATER SYSTEM)

Systems, Structures, and Components

This section discusses the OCCW (or service water) system, which consists of piping, heat exchangers, pumps, flow orifices, basket strainers, and valves, including containment isolation valves. Because the characteristics of an OCCW system may be unique to each facility, the OCCW system is defined as a system or systems that transfer heat from safety-related systems, structures and components to the ultimate heat sink (UHS), such as a lake, ocean, river, spray pond, or cooling tower. The aging management programs described in this section apply to any such system, provided the service conditions and materials of construction are identical to those identified in the section. The system removes heat from the CCCW system, and, in some plants, other auxiliary systems and components, such as steam turbine bearing oil coolers or miscellaneous coolers in the condensate system. The only heat exchangers addressed in this section are those that remove heat from the CCCW system. Heat exchangers for removing heat from other auxiliary systems and components are addressed in their respective systems, such as those for the steam turbine bearing oil coolers (VIII.A) and for the condensate system coolers (VIII.E).

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the OCCW system are governed by Group C Quality Standards, with the exception of those forming part of the containment penetration boundary, which are governed by Group B Quality Standards.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

Aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that may interface with the OCCW system include the CCCW system (VII.C2), the UHS (VII.C3), the emergency diesel generator system (VII.H2), the containment spray system (V.A), the PWR steam generator blowdown system (VIII.F), the condensate system (VIII.E), the auxiliary feedwater system (PWR) (VIII.G), the emergency core cooling system (PWR) (V.D1), and the emergency core cooling system boiling water reactor (V.D2).

Table C.1 Open-Cycle Cooling Water System (Service Water System)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-532	3.3-1, 193	Any	Steel	Raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.C1.AP-179	3.3-1, 038	Heat exchanger components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC); flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.A-66	3.3-1, 072	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.C1.A-417	3.3-1, 096b	Heat exchanger components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.C1.AP-183	3.3-1, 038	Heat exchanger components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.AP-152a	3.3-1, 123	Heat exchanger components other than tubes	Titanium	Raw water	Cracking due to stress corrosion cracking (SCC), flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.AP-152b	3.3-1, 123	Heat exchanger components other than tubes (for components not covered by U.S. Nuclear Regulatory Commission [NRC] Generic Letters [GL] 89-13)	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.AP-187	3.3-1, 042	Heat exchanger tubes	Stainless steel, copper alloy, titanium	Raw water	Cracking due to SCC (titanium only); reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C1.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC; reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	VII.C1.A-795a	3.3-1, 261	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC; flow blockage due to fouling.	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-736	3.3-1, 207	Heat exchanger tubes (for components not covered by NRC GL 89-13)	Stainless steel, copper alloy, titanium	Raw water	Cracking due to SCC (titanium only); reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-778	3.3-1, 249	Heat exchanger tubes internal to components	Steel	Air – outdoor, air – indoor uncontrolled, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-419	3.3-1, 096a	Heat exchanger tubes internal to components	Steel, stainless steel, copper alloy, aluminum, titanium	Air, condensation (external)	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.C1.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.C1.A-793a	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.AP-250	3.3-1, 030	Piping, piping components	Concrete, concrete cylinder piping, reinforced concrete, asbestos cement, cementitious	Raw Water	Cracking due to chemical reaction, weathering, settlement, or corrosion of reinforcement (reinforced concrete only); loss of material due to delamination, exfoliation, spalling, popout, scaling, or cavitation; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.AP-133	3.3-1, 099	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C1.AP-196	3.3-1, 034	Piping, piping components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.A-47	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.C1.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.C1.AP-238	3.3-1, 030a	Piping, piping components	Fiberglass	Raw water	Cracking, blistering, loss of material due to exposure to radiation, temperature, or moisture; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
M	VII.C1.A-51	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.C1.A-02	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.C1.AP-239	3.3-1, 030a	Piping, piping components	High-density polyethylene (HDPE)	Raw water	Cracking, blistering, loss of material due to exposure to radiation, temperature, or moisture; flow blockage due to fouling	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
-	VII.C1.A-409	3.3-1, 126	Piping, piping components	Metallic	Raw water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VII.C1.AP-206	3.3-1, 034	Piping, piping components	Nickel alloy	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.A-458	3.3-1, 172	Piping, piping components	Polyvinyl chloride (PVC)	Air – outdoor	Reduction in impact strength due to photolysis	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
M	VII.C1.A-787a	3.3-1, 253	Piping, piping components	PVC	Raw water, treated water	Loss of material due to wear (not applicable in low flow environments); flow blockage due to fouling (raw water only)	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VII.C1.A-792	3.3-1, 253	Piping	CFRP	Raw water	Loss of material, cracking, and blistering due to wear, tearing, delamination, void, debonding, chemical attack, or moisture; flow blockage due to fouling, delamination, debonding, or tearing	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
-	VII.C1.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C1.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.C1.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.AP-138	3.3-1, 100	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C1.A-54	3.3-1, 040	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C1.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.C1.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C1.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C1.AP-194	3.3-1, 037	Piping, piping components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.AP-161a	3.3-1, 123	Piping, piping components	Titanium	Raw water	Cracking due to SCC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.A-793b	3.3-1, 259	Piping, piping components (for components not covered by NRC GL 89-13)	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-737	3.3-1, 208	Piping, piping components (for components not covered by NRC GL 89-13)	Concrete, concrete cylinder piping, reinforced concrete, asbestos cement, cementitious	Raw water	Cracking due to chemical reaction, weathering, settlement, or corrosion of reinforcement (reinforced concrete only); loss of material due to delamination, exfoliation, spalling, popout, scaling, or cavitation; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	VII.C1.A-739	3.3-1, 210	Piping, piping components (for components not covered by NRC GL 89-13)	HDPE	Raw water	Cracking, blistering, loss of material due to exposure to radiation, temperature or moisture; flow blockage due to fouling	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
M	VII.C1.A-787c	3.3-1, 253	Piping, piping components (for components not covered by NRC GL 89-13)	PVC	Raw water, treated water	Loss of material due to wear (not applicable in low flow environments); flow blockage due to fouling (raw water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.AP-161b	3.3-1, 123	Piping, piping components (for components not covered by NRC GL 89-13)	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-796a	3.3-1, 262	Piping, piping components, heat exchanger components	Titanium	Closed-cycle cooling water, treated water	Cracking due to SCC	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C1.A-473b	3.3-1, 160	Piping, piping components, heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Raw water	Cracking due to SCC	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-454	3.3-1, 158	Piping, piping components, heat exchanger components (for components not covered by NRC GL 89-13)	Nickel alloy	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-727	3.3-1, 134	Piping, piping components, heat exchanger components (for components not covered by NRC GL 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/lining	Raw water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/lining	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.C1.AP-76	3.3-1, 096	Piping, piping components, seals	Elastomer	Air, raw water	Loss of material due to wear; flow blockage due to fouling (raw water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.AP-75	3.3-1, 085	Piping, piping components, seals	Elastomer	Raw water	Hardening or loss of strength due to elastomer degradation; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.C1.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C1.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C1.A-776a	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.C1.A-776b	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-776c	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C1.A-776d	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C1.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C1.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C1.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
M	VII.C1.A-400a	3.3-1, 127	Piping, piping components, tanks	Metallic	Raw water	Loss of material due to recurring internal corrosion	AMP XI.M20, "Open-Cycle Cooling Water System"	Yes
N	VII.C1.A-400b	3.3-1, 127	Piping, piping components, tanks (for components not covered by NRC GL 89-13)	Metallic	Raw water	Loss of material due to recurring internal corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C1.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
M	VII.C1.A-460	3.3-1, 175	Piping, piping components, tanks (for components not covered by NRC GL 89-13)	Fiberglass	Raw water	Cracking, blistering, loss of material due to exposure to radiation, temperature, or moisture; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C1.A-461	3.3-1, 176	Piping, piping components, tanks (for components not covered by NRC GL 89-13)	Fiberglass	Raw water	Loss of material due to wear; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
D	VII.C1.A-405	-	-	-	-	-	-	-
D	VII.C1.A-418	-	-	-	-	-	-	-
D	VII.C1.A-426	-	-	-	-	-	-	-
D	VII.C1.A-456	-	-	-	-	-	-	-
D	VII.C1.A-457	-	-	-	-	-	-	-
D	VII.C1.A-459	-	-	-	-	-	-	-
D	VII.C1.A-469	-	-	-	-	-	-	-

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.C1.A-714a	-	-	-	-	-	-	-
D	VII.C1.A-714b	-	-	-	-	-	-	-
D	VII.C1.A-714c	-	-	-	-	-	-	-
D	VII.C1.A-72	-	-	-	-	-	-	-
D	VII.C1.A-733	-	-	-	-	-	-	-
D	VII.C1.A-738	-	-	-	-	-	-	-
D	VII.C1.A-740	-	-	-	-	-	-	-
D	VII.C1.A-741	-	-	-	-	-	-	-
D	VII.C1.A-742	-	-	-	-	-	-	-
D	VII.C1.A-749	-	-	-	-	-	-	-
D	VII.C1.A-750	-	-	-	-	-	-	-
D	VII.C1.A-771a	-	-	-	-	-	-	-
D	VII.C1.A-771b	-	-	-	-	-	-	-
D	VII.C1.A-771c	-	-	-	-	-	-	-
D	VII.C1.A-771d	-	-	-	-	-	-	-
D	VII.C1.A-772a	-	-	-	-	-	-	-
D	VII.C1.A-772b	-	-	-	-	-	-	-
D	VII.C1.A-772c	-	-	-	-	-	-	-
D	VII.C1.A-772d	-	-	-	-	-	-	-
D	VII.C1.A-790a	-	-	-	-	-	-	-
D	VII.C1.A-790b	-	-	-	-	-	-	-
D	VII.C1.AP-137	-	-	-	-	-	-	-
D	VII.C1.AP-153	-	-	-	-	-	-	-
D	VII.C1.AP-155	-	-	-	-	-	-	-
D	VII.C1.AP-156	-	-	-	-	-	-	-
D	VII.C1.AP-178	-	-	-	-	-	-	-
D	VII.C1.AP-198	-	-	-	-	-	-	-
D	VII.C1.AP-209e	-	-	-	-	-	-	-
D	VII.C1.AP-237	-	-	-	-	-	-	-
D	VII.C1.AP-248	-	-	-	-	-	-	-
D	VII.C1.AP-249	-	-	-	-	-	-	-
D	VII.C1.AP-251	-	-	-	-	-	-	-

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.C1.AP-252	-	-	-	-	-	-	-

AMP = aging management program; CFRP = Piping and Carbon Fiber Reinforced Polymer; GL = Generic Letters; HDPE = High-density polyethylene; MIC = microbiologically influenced corrosion; NRC = U.S. Nuclear Regulatory Commission; PVC = polyvinyl chloride; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

C2 CLOSED-CYCLE COOLING WATER SYSTEM

Systems, Structures, and Components

This section discusses the CCCW system, which consists of piping, radiation elements, temperature elements, heat exchangers, pumps, tanks, flow orifices, and valves, including containment isolation valves. The system contains chemically treated demineralized water. The CCCW system is designed to remove heat from various auxiliary structures and components such as the chemical and volume control system (CVCS) and the spent fuel cooling system to the OCCW system (VII.C1). A CCCW system is defined as part of the service water system that does not reject heat directly to a heat sink, has water chemistry control, and is not subject to significant sources of contamination.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components in the CCCW system are classified as Group C Quality Standards, with the exception of those forming part of the containment penetration boundary, which are Group B.

The aging management programs (AMPs) for the heat exchanger between the CCCW and the OCCW systems are addressed in the OCCW (VII.C1). The AMPs for the heat exchangers between the CCCW system and the interfacing auxiliary systems are included in the evaluations of their respective systems, such as those for the PWR and BWR SFP cooling and cleanup systems (VII.A3 and VII.A4, respectively) and the PWR CVCS (VII.E1).

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

AMPs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the CCCW system include the OCCW system (VII.C1), the PWR SFP cooling and cleanup system (VII.A3), the BWR SFP cooling and cleanup system (VII.A4), the PWR CVCS (VII.E1), the BWR reactor water cleanup (RWCU) system (VII.E3), the shutdown cooling system (older BWR, VII.E4), the primary containment heating and ventilation system (VII.F3), fire protection (VII.G), the emergency diesel generator system (VII.H2), the PWR containment spray system (V.A), the PWR and BWR emergency core cooling systems (V.D1 and V.D2), the PWR steam generator (SG) blowdown system (VIII.F), the condensate system (VIII.E), and the PWR auxiliary feedwater system (VIII.G).

Table C.2 Closed-Cycle Cooling Water System

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C2.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.C2.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.AP-205	3.3-1, 050	Heat exchanger tubes	Copper Alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.AP-188	3.3-1, 050	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C2.A-767	3.3-1, 238	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to stress corrosion cracking (SCC); reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
M	VII.C2.A-795b	3.3-1, 261	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Closed-cycle cooling water	Cracking due to SCC; flow blockage due to fouling.	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.C2.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.C2.AP-254	3.3-1, 048	Piping, piping components	Aluminum	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C2.AP-130	3.3-1, 025	Piping, piping components	Aluminum	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C2.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C2.AP-133	3.3-1, 099	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C2.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.C2.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.C2.AP-32	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.C2.A-50	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.C2.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.C2.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C2.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.C2.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C2.A-52	3.3-1, 049	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.AP-186	3.3-1, 043	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.AP-138	3.3-1, 100	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C2.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C2.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.C2.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C2.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C2.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C2.A-471	3.3-1, 147	Piping, piping components	Nickel alloy, nickel alloy cladding	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C2.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C2.A-796b	3.3-1, 262	Piping, piping components, heat exchanger components	Titanium	Closed-cycle cooling water, treated water	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.A-473a	3.3-1, 160	Piping, piping components, heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.C2.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C2.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.C2.AP-259	3.3-1, 085	Piping, piping components, seals	Elastomer	Closed-cycle cooling water	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C2.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C2.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C2.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C2.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C2.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C2.AP-202	3.3-1, 045	Piping, piping components, tanks	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
D	VII.C2.A-400	-	-	-	-	-	-	-

New, Modified, Deleted, Edited Item	Item	Standard Review Plant (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.C2.A-405	-	-	-	-	-	-	-
D	VII.C2.A-454	-	-	-	-	-	-	-
D	VII.C2.A-456	-	-	-	-	-	-	-
D	VII.C2.A-477	-	-	-	-	-	-	-
D	VII.C2.A-714a	-	-	-	-	-	-	-
D	VII.C2.A-714b	-	-	-	-	-	-	-
D	VII.C2.A-714c	-	-	-	-	-	-	-
D	VII.C2.A-733	-	-	-	-	-	-	-
D	VII.C2.A-749	-	-	-	-	-	-	-
D	VII.C2.A-750	-	-	-	-	-	-	-
D	VII.C2.A-790a	-	-	-	-	-	-	-
D	VII.C2.A-790b	-	-	-	-	-	-	-
D	VII.C2.AP-209e	-	-	-	-	-	-	-
D	VII.C2.AP-257	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

C3 ULTIMATE HEAT SINK

Systems, Structures, and Components

The UHS consists of a lake, ocean, river, spray pond, or cooling tower. The UHS provides sufficient cooling water for safe reactor shutdown and reactor cooldown via the residual heat removal system or other similar system. Because of the varying configurations of connections to lakes, oceans, and rivers, a plant-specific AMP is required. Appropriate AMPs shall be provided to trend and project (1) the deterioration of earthen dams and impoundments; (2) the rate of silt deposition; (3) meteorological, climatological, and oceanic data since obtaining the Final Safety Analysis Report data; (4) the water level extremes for plants located on rivers; and (5) the aging degradation of all upstream and downstream dams affecting the UHS.

The systems, structures, and components included in this section consist of piping, valves, and pumps. The cooling tower is addressed in this report with water-control structures (III.A6). The UHS absorbs heat from the residual heat removal system or other similar system. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the piping and valves used for the UHS are governed by Group C Quality Standards.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The AMPs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the UHS include the open-cycle cooling water system (VII.C1) and the pressurized water reactor and boiling water reactor emergency core cooling systems (V.D1 and V.D2).

Table C.3 Ultimate Heat Sink

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-532	3.3-1, 193	Any	Steel	Raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.C3.AP-152a	3.3-1, 123	Heat exchanger components other than tubes	Titanium	Raw water	Cracking due to stress corrosion cracking (SCC), flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C3.AP-187	3.3-1, 042	Heat exchanger tubes	Stainless steel, copper alloy, titanium	Raw water	Cracking due to SCC (titanium only); reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C3.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.C3.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC; reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	VII.C3.A-795a	3.3-1, 261	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC; flow blockage due to fouling.	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.C3.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.C3.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C3.AP-195	3.3-1, 034	Piping, piping components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC); flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C3.A-47	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.C3.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.C3.A-51	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.C3.A-02	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.C3.AP-206	3.3-1, 034	Piping, piping components	Nickel alloy	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C3.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C3.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.C3.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-53	3.3-1, 040	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C3.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C3.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.C3.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C3.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.AP-194	3.3-1, 037	Piping, piping components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C3.AP-161a	3.3-1, 123	Piping, piping components	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.C3.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.C3.A-796a	3.3-1, 262	Piping, piping components, heat exchanger components	Titanium	Closed-cycle cooling water, treated water	Cracking due to SCC	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.C3.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.C3.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C3.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C3.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C3.A-776a	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.C3.A-776b	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-776c	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C3.A-776d	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C3.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C3.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.C3.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
M	VII.C3.A-400a	3.3-1, 127	Piping, piping components, tanks	Metallic	Raw water	Loss of material due to recurring internal corrosion	AMP XI.M20, "Open-Cycle Cooling Water System"	Yes
N	VII.C3.A-400b	3.3-1, 127	Piping, piping components, tanks (for components not covered by U.S. Nuclear Regulatory Commission Generic Letters 89-13)	Metallic	Raw water	Loss of material due to recurring internal corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C3.A-756a	3.3-1, 227	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.C3.A-756b	3.3-1, 227	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-756c	3.3-1, 227	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C3.A-482a	3.3-1, 186	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.C3.A-482b	3.3-1, 186	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
E	VII.C3.A-482c	3.3-1, 186	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C3.A-760a	3.3-1, 231	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.C3.A-760b	3.3-1, 231	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-760c	3.3-1, 231	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C3.A-759	3.3-1, 230	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VII.C3.A-758	3.3-1, 229	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VII.C3.A-757a	3.3-1, 228	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.C3.A-757b	3.3-1, 228	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.C3.A-757c	3.3-1, 228	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.C3.A-401	3.3-1, 128	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel	Soil, concrete, air, condensation, raw water	Loss of material due to general, pitting, crevice corrosion, MIC (soil, raw water only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VII.C3.A-413	3.3-1, 137	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel, stainless steel, aluminum	Treated water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
D	VII.C3.A-405	-	-	-	-	-	-	-
D	VII.C3.A-425	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.C3.A-426	-	-	-	-	-	-	-
D	VII.C3.A-456	-	-	-	-	-	-	-
D	VII.C3.A-714a	-	-	-	-	-	-	-
D	VII.C3.A-714b	-	-	-	-	-	-	-
D	VII.C3.A-714c	-	-	-	-	-	-	-
D	VII.C3.A-749	-	-	-	-	-	-	-
D	VII.C3.A-750	-	-	-	-	-	-	-
D	VII.C3.A-754a	-	-	-	-	-	-	-
D	VII.C3.A-755	-	-	-	-	-	-	-
D	VII.C3.A-790a	-	-	-	-	-	-	-
D	VII.C3.A-790b	-	-	-	-	-	-	-
D	VII.C3.AP-137	-	-	-	-	-	-	-
D	VII.C3.AP-198	-	-	-	-	-	-	-
D	VII.C3.AP-209e	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

D COMPRESSED AIR SYSTEM

Systems, Structures, and Components

This section discusses the compressed air system, which consists of piping, valves (including containment isolation valves), air receivers, pressure regulators, filters, and dryers. The system components and piping are located in various buildings at most nuclear power plants. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components of the compressed air system are classified as Group D Quality Standards, with the exception of those forming part of the containment penetration boundary, which are Group B. However, the cleanliness of these components and high air quality is to be maintained because the air provides the motive power for instruments and active components (some of them safety-related) that may not function properly if nonsafety Group D equipment is contaminated.

With respect to filters, these items are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* (10 CFR) 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to 10 CFR 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

Various other systems discussed in this report may interface with the compressed air system.

Table D.1 Compressed Air System

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VII.D.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Air-dry, air, condensation	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
N	VII.D.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Air-dry, air, condensation	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.D.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.D.A-764	3.3-1, 235	Piping, piping components	Metallic	Air – dry	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M24, "Compressed Air Monitoring"	No
-	VII.D.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.D.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.D.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.D.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.D.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.D.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.D.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, “Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.D.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.D.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.D.A-729	3.3-1, 085	Piping, piping components, seals	Elastomer	Gas	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.D.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.D.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.D.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.D.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.D.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.D.A-26	3.3-1, 055	Piping, piping components, tanks	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
D	VII.D.A-400	-	-	-	-	-	-	-
D	VII.D.A-405	-	-	-	-	-	-	-
D	VII.D.A-414	-	-	-	-	-	-	-
D	VII.D.A-415	-	-	-	-	-	-	-
D	VII.D.A-416	-	-	-	-	-	-	-

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.D.A-456	-	-	-	-	-	-	-
D	VII.D.A-498	-	-	-	-	-	-	-
D	VII.D.A-714a	-	-	-	-	-	-	-
D	VII.D.A-714b	-	-	-	-	-	-	-
D	VII.D.A-714c	-	-	-	-	-	-	-
D	VII.D.A-733	-	-	-	-	-	-	-
D	VII.D.A-749	-	-	-	-	-	-	-
D	VII.D.A-750	-	-	-	-	-	-	-
D	VII.D.A-80	-	-	-	-	-	-	-
D	VII.D.AP-121	-	-	-	-	-	-	-
D	VII.D.AP-240	-	-	-	-	-	-	-
D	VII.D.AP-81	-	-	-	-	-	-	-

AMP = aging management program; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

E ADDITIONAL SYSTEMS

E1 CHEMICAL AND VOLUME CONTROL SYSTEM (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section discusses a portion of the PWR chemical and volume control system (CVCS). The portion of the PWR CVCS covered in this section extends from the isolation valves associated with the RCPB (and Code change as discussed below) to the volume control tank. This portion of the PWR CVCS consists of high- and low-pressure piping and valves (including the containment isolation valves), regenerative and letdown heat exchangers, pumps, basket strainers, and the volume control tank. The system contains chemically treated borated water; the shell side of the letdown heat exchanger contains CCCW (treated water).

Based on Regulatory Guide1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the CVCS are governed by Group C Quality Standards. Portions of the CVCS extending from the reactor coolant system up to and including the isolation valves associated with RCPB are governed by Group A Quality Standards and covered in IV.C2.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the CVCS include the reactor coolant system (IV.C2), the emergency core cooling system (V.D1), the spent fuel pool cooling system (VII.A3), and the CCCW system (VII.C2).

Table E.1 Chemical and Volume Control System (PWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.AP-203	3.3-1, 046	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E1.AP-65	3.3-1, 072	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E1.AP-118	3.3-1, 020	Heat exchanger components	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking (SCC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E1.A-100	3.3-1, 002	Heat exchanger components and tubes	Stainless steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.AP-119	3.3-1, 008	Heat exchanger components and tubes	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	VII.E1.A-101	3.3-1, 017	Heat exchanger tubes	Stainless steel	Treated borated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC; reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.A-69	3.3-1, 003	Heat exchanger tubing, non-regenerative	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to SCC; cyclic loading	AMP XI.M2, "Water Chemistry"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.A-69a	3.3-1, 003a	Heat exchanger tubing, non-regenerative	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to SCC; cyclic loading	AMP XI.M2, "Water Chemistry," and AMP XI.M21A, "Closed Treated Water Systems"	Yes
-	VII.E1.AP-115	3.3-1, 007	High-pressure pump casing	Stainless steel	Treated borated water	Cracking due to cyclic loading	AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD"	No
-	VII.E1.AP-114	3.3-1, 018	High-pressure pump casing	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E1.AP-133	3.3-1, 099	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.E1.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E1.A-407	3.3-1, 126	Piping, piping components	Metallic	Treated borated water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VII.E1.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.E1.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E1.A-57	3.3-1, 002	Piping, piping components	Stainless steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VII.E1.AP-138	3.3-1, 100	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.A-103	3.3-1, 124	Piping, piping components	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.E1.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E1.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E1.AP-79	3.3-1, 125	Piping, piping components	Stainless steel, steel with stainless steel cladding, nickel alloy	Treated borated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.A-34	3.3-1, 002	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VII.E1.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E1.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E1.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E1.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.E1.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E1.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E1.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E1.AP-82	3.3-1, 028	Piping, piping components, tanks	Stainless steel	Treated borated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
D	VII.E1.A-102	-	-	-	-	-	-	-
D	VII.E1.A-400	-	-	-	-	-	-	-
D	VII.E1.A-405	-	-	-	-	-	-	-
D	VII.E1.A-414	-	-	-	-	-	-	-
D	VII.E1.A-415	-	-	-	-	-	-	-
D	VII.E1.A-416	-	-	-	-	-	-	-
D	VII.E1.A-714a	-	-	-	-	-	-	-
D	VII.E1.A-714b	-	-	-	-	-	-	-
D	VII.E1.A-714c	-	-	-	-	-	-	-
D	VII.E1.A-749	-	-	-	-	-	-	-
D	VII.E1.A-750	-	-	-	-	-	-	-
D	VII.E1.A-79	-	-	-	-	-	-	-
D	VII.E1.A-790a	-	-	-	-	-	-	-
D	VII.E1.A-790b	-	-	-	-	-	-	-
D	VII.E1.A-88	-	-	-	-	-	-	-
D	VII.E1.AP-1	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.E1.AP-120	-	-	-	-	-	-	-
D	VII.E1.AP-122	-	-	-	-	-	-	-
D	VII.E1.AP-85	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

E2 STANDBY LIQUID CONTROL SYSTEM (BOILING WATER REACTOR)

Systems, Structures, and Components

This section discusses the portion of the standby liquid control (SLC) system extending from the containment isolation valve to the solution storage tank. The system serves as a backup reactivity control system in all BWRs. The major components of this system are the piping, the solution storage tank, the solution storage tank heaters, valves, and pumps. All of the components from the storage tank to the explosive actuated discharge valve operate in contact with a sodium pentaborate ($Na_2B_{10}O_{16}•10H_2O$) solution.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the SLC system are governed by Group B Quality Standards. The portions of the SLC system extending from the reactor coolant pressure boundary up to and including the containment isolation valves are governed by Group A Quality Standards and are covered in IV.C1.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The system that interfaces with the SLC system is the BWR reactor pressure vessel (IV.A1). If used, the SLC system would inject sodium pentaborate solution into the pressure vessel near the bottom of the reactor core.

Table E.2 Standby Liquid Control System (BWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E2.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
M	VII.E2.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.E2.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E2.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E2.A-796c	3.3-1, 262	Piping, piping components, heat exchanger components	Titanium	Closed-cycle cooling water, treated water	Cracking due to stress corrosion cracking (SCC)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E2.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E2.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.E2.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E2.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E2.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E2.AP-181	3.3-1, 018	Piping, piping components, tanks	Stainless steel	Sodium pentaborate solution >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	VII.E2.AP-141	3.3-1, 203	Piping, piping components, tanks	Stainless steel, steel, nickel alloy	Sodium pentaborate solution	Loss of material due to pitting, crevice corrosion, microbially influenced corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VII.E2.A-798	3.3.1-264	Piping, piping components, tanks	Steel	Treated water, sodium pentaborate solution	Long-term loss of material due to general corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, One Time Inspection	No
D	VII.E2.A-400	-	-	-	-	-	-	-
D	VII.E2.A-405	-	-	-	-	-	-	-
D	VII.E2.A-414	-	-	-	-	-	-	-
D	VII.E2.A-416	-	-	-	-	-	-	-
D	VII.E2.A-749	-	-	-	-	-	-	-

AMP = aging management program; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

E3 REACTOR WATER CLEANUP SYSTEM (BOILING WATER REACTOR)

Systems, Structures, and Components

This section discusses the RWCU system, which provides for cleanup and particulate removal from the recirculating reactor coolant in all BWRs. Some plants may not include the RWCU system in the scope of license renewal, while other plants may include the RWCU system because it is associated with safety-related functions.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the portions of the RWCU system extending from the reactor coolant recirculation system up to and including the containment isolation valves are covered in IV.C1. The remainder of the system outboard of the isolation valves is governed by Group C Quality Standards. In this table, only aging management programs for RWCU-related piping and components outboard of the isolation valves are evaluated. The AMP for containment isolation valves in the RWCU system is evaluated in IV.C1, which concerns the RCPB in BWRs.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the BWR RWCU system include the RCPB (IV.C1), the closed-cycle cooling water system (VII.C2), and the condensate system (VIII.E).

Table E.3 Reactor Water Cleanup System (BWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E3.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.E3.AP-191	3.3-1, 047	Heat exchanger components	Stainless steel, steel with stainless steel cladding	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E3.AP-192	3.3-1, 044	Heat exchanger components	Stainless steel, steel with stainless steel cladding	Closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking (SCC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E3.AP-112	3.3-1, 020	Heat exchanger components	Stainless steel, steel with stainless steel cladding	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E3.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E3.AP-188	3.3-1, 050	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E3.AP-139	3.3-1, 027	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E3.A-767	3.3-1, 238	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E3.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	VII.E3.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.E3.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E3.AP-130	3.3-1, 025	Piping, piping components	Aluminum	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E3.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E3.AP-140	3.3-1, 022	Piping, piping components	Copper alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E3.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E3.AP-32	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.E3.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E3.A-408	3.3-1, 126	Piping, piping components	Metallic	Treated water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VII.E3.A-62	3.3-1, 002	Piping, piping components	Stainless steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VII.E3.AP-186	3.3-1, 043	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E3.AP-110	3.3-1, 203	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E3.A-773	3.3-1, 244	Piping, piping components	Stainless steel, nickel alloy	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E3.A-34	3.3-1, 002	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VII.E3.AP-106	3.3-1, 021	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E3.AP-283	3.3-1, 016	Piping, piping components outboard the second containment isolation valves with a diameter ≥4 inches nominal pipe size	Stainless steel	Treated water >93°C (>200°F)	Cracking due to SCC, intergranlular SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M25, "BWR Reactor Water Cleanup System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E3.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E3.A-796c	3.3-1, 262	Piping, piping components, heat exchanger components	Titanium	Closed-cycle cooling water, treated water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E3.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E3.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E3.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.E3.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E3.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E3.AP-120	3.3-1, 019	Regenerative heat exchanger components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
D	VII.E3.A-400	-	-	-	-	-	-	-
D	VII.E3.A-405	-	-	-	-	-	-	-
D	VII.E3.A-414	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.E3.A-416	-	-	-	-	-	-	-
D	VII.E3.A-749	-	-	-	-	-	-	-
D	VII.E3.A-790a	-	-	-	-	-	-	-
D	VII.E3.A-790b	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

E4 SHUTDOWN COOLING SYSTEM (OLDER BOILING WATER REACTOR)

Systems, Structures, and Components

This section discusses the shutdown cooling (SDC) system for older vintage BWRs and consists of piping and fittings, the SDC system pump, the heat exchanger, and valves.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the SDC system are governed by Group B Quality Standards. Portions of the SDC system extending from the RCPB up to and including the containment isolation valves are governed by Group A Quality Standards and are covered in IV.C1.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the SDC system include the RCPB (IV.C1) and the closed-cycle cooling water system (VII.C2).

Table E.4 Shutdown Cooling System (Older BWR)

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.A-532	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-191	3.3-1, 047	Heat exchanger components	Stainless steel, steel with stainless steel cladding	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E4.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E4.AP-152a	3.3-1, 123	Heat exchanger components other than tubes	Titanium	Raw water	Cracking due to stress corrosion cracking (SCC), flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.E4.AP-188	3.3-1, 050	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E4.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.A-767	3.3-1, 238	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.E4.A-795a	3.3-1, 261	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC, flow blockage due to fouling.	AMP XI.M20, "Open-Cycle Cooling Water System"	No
M	VII.E4.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.E4.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E4.AP-130	3.3-1, 025	Piping, piping components	Aluminum	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.AP-133	3.3-1, 099	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-140	3.3-1, 022	Piping, piping components	Copper alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E4.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E4.AP-32	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.E4.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E4.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.E4.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E4.A-62	3.3-1, 002	Piping, piping components	Stainless steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VII.E4.AP-186	3.3-1, 043	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.E4.AP-138	3.3-1, 100	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.E4.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E4.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E4.AP-110	3.3-1, 203	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.A-773	3.3-1, 244	Piping, piping components	Stainless steel, nickel alloy	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-106	3.3-1, 021	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.E4.AP-161a	3.3-1, 123	Piping, piping components	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.E4.A-61	3.3-1, 110	Piping, piping components greater than or equal to 4 nominal pipe size	Stainless steel, nickel alloy	Treated water >93°C (>200°F)	Cracking due to SCC, intergranular SCC	AMP XI.M7, "BWR Stress Corrosion Cracking," and AMP XI.M2, "Water Chemistry"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E4.A-796a	3.3-1, 262	Piping, piping components, heat exchanger components	Titanium	Closed-cycle cooling water, treated water	Cracking due to SCC	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.E4.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.E4.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/lining	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E4.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.E4.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	-VII.E4.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E4.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E4.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VII.E4.A-400	-	-	-	-	-	-	-
D	VII.E4.A-405	-	-	-	-	-	-	-
D	VII.E4.A-714a	-	-	-	-	-	-	-
D	VII.E4.A-714b	-	-	-	-	-	-	-
D	VII.E4.A-714c	-	-	-	-	-	-	-
D	VII.E4.A-749	-	-	-	-	-	-	-
D	VII.E4.A-750	-	-	-	-	-	-	-
D	VII.E4.A-790a	-	-	-	-	-	-	-
D	VII.E4.A-790b	-	-	-	-	-	-	-
D	VII.E4.AP-209e	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

E5 WASTE WATER SYSTEMS

Systems, Structures, and Components

This section discusses liquid waste systems such as liquid radioactive waste systems, oily waste systems, floor drainage systems, chemical waste water systems, and secondary waste water systems. Plants may include portions of wastewater systems within the scope of license renewal based on the criterion of Title 10 of the *Code of Federal Regulations* (10 CFR) 54.4.(a)(2).

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” radioactive-waste-containing portions of wastewater systems are classified as Group C Quality Standards, with the exception of those forming part of the containment pressure boundary, which is classified as Group B. Wastewater systems that do not contain radioactive waste or form a part of the containment pressure boundary are classified as Group D.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to 10 CFR 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

Various other systems discussed in this report may interface with wastewater systems.

Table E.5 Waste Water Systems

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-785	3.3-1, 193	Any	Steel	Waste water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.E5.A-769a	3.3-1, 240	Heat exchanger components	Aluminum	Waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.E5.A-769b	3.3-1, 240	Heat exchanger components	Aluminum	Waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.E5.A-769c	3.3-1, 240	Heat exchanger components	Aluminum	Waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.E5.A-769d	3.3-1, 240	Heat exchanger components	Aluminum	Waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.AP-276	3.3-1, 095	Heat exchanger components	Nickel alloy	Waste Water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC); flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E5.AP-275	3.3-1, 095	Heat exchanger components	Stainless steel	Waste Water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	VII.E5.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.AP-271	3.3-1, 093	Piping, piping components	Copper alloy	Raw water (potable)	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E5.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.E5.A-724	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron, copper alloy (>15% Zn or >8% Al)	Soil, waste water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.E5.A-780	3.3-1, 258	Piping, piping components	Metallic, elastomer, fiberglass, High Density Polyethylene (HDPE)	Waste water	Flow blockage due to fouling	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	VII.E5.A-458	3.3-1, 172	Piping, piping components	Polyvinyl chloride (PVC)	Air – outdoor	Reduction in impact strength due to photolysis	AMP XI.M36, “External Surfaces Monitoring of Mechanical Components”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.E5.A-787d	3.3-1, 253	Piping, piping components	PVC	Waste water	Loss of material due to wear (not applicable in low flow environments); flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E5.AP-270	3.3-1, 088	Piping, piping components	Steel; stainless steel	Raw water (potable)	Loss of material due to general (steel only), pitting, crevice corrosion, flow blockage due to fouling (steel only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E5.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	VII.E5.AP-272	3.3-1, 095	Piping, piping components, heat exchanger components	Copper alloy	Waste water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
M	VII.E5.A-547	3.3-1, 072	Piping, piping components, heat exchanger components	Gray cast iron, ductile iron, malleable iron, copper alloy (>15% Zn or >8% Al)	Waste water	Loss of material due to selective leaching	AMP XI.M33, “Selective Leaching”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E5.A-473c	3.3-1, 160	Piping, piping components, heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Waste water	Cracking due to stress corrosion cracking (SCC)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E5.AP-281	3.3-1, 091	Piping, piping components, heat exchanger components, tanks	Steel	Waste water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Waste water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.E5.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Waste water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.E5.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-550	3.3-1, 096	Piping, piping components, seals	Elastomer	Air, waste water	Loss of material due to wear; flow blockage due to fouling (waste water only)	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	VII.E5.A-728	3.3-1, 085	Piping, piping components, seals	Elastomer	Waste water	Hardening or loss of strength due to elastomer degradation; flow blockage due to fouling	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	VII.E5.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, “One-Time Inspection”	Yes
-	VII.E5.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, “External Surfaces Monitoring of Mechanical Components”	Yes
-	VII.E5.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E5.A-776a	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.E5.A-776b	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.E5.A-776c	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-776d	3.3-1, 247	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.E5.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.E5.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.E5.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
M	VII.E5.A-551	3.3-1, 175	Piping, piping components, tanks	Fiberglass	Waste water	Cracking, blistering, loss of material due to exposure to radiation, temperature, or moisture; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.E5.A-552	3.3-1, 176	Piping, piping components, tanks	Fiberglass	Waste water	Loss of material due to wear; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.E5.A-400b	3.3-1, 127	Piping, piping components, tanks	Metallic	Waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	Yes
-	VII.E5.AP-279	3.3-1, 095	Piping, piping components, tanks	Nickel alloy	Waste water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	VII.E5.AP-278	3.3-1, 095	Piping, piping components, tanks	Stainless steel	Waste water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	VII.E5.A-721	3.3-1, 155	Piping, piping components, tanks	Stainless steel	Waste water >60°C (>140°F)	Cracking due to SCC	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-26	3.3-1, 055	Piping, piping components, tanks	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components”	No
-	VII.E5.A-411	3.3-1, 135	Pump casings	Stainless steel	Waste water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M36, “External Surfaces Monitoring of Mechanical Components”	No
-	VII.E5.A-410	3.3-1, 135	Pump casings	Steel	Waste water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M36, “External Surfaces Monitoring of Mechanical Components”	No
-	VII.E5.A-756a	3.3-1, 227	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-756b	3.3-1, 227	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, “One-Time Inspection”	Yes
-	VII.E5.A-756c	3.3-1, 227	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, “Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks”	Yes
-	VII.E5.A-482a	3.3-1, 186	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Yes
-	VII.E5.A-482b	3.3-1, 186	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M32, “One-Time Inspection”	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-482c	3.3-1, 186	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M42, “Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks”	Yes
-	VII.E5.A-760a	3.3-1, 231	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Yes
-	VII.E5.A-760b	3.3-1, 231	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, “One-Time Inspection”	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-760c	3.3-1, 231	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, “Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks”	Yes
-	VII.E5.A-759	3.3-1, 230	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel	Soil, concrete	Cracking due to SCC	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	No
-	VII.E5.A-758	3.3-1, 229	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	No
-	VII.E5.A-757a	3.3-1, 228	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.E5.A-757b	3.3-1, 228	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, “One-Time Inspection”	Yes
-	VII.E5.A-757c	3.3-1, 228	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, “Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks”	Yes
-	VII.E5.A-401	3.3-1, 128	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Steel	Soil, concrete, air, condensation, raw water	Loss of material due to general, pitting, crevice corrosion, MIC (soil, raw water only)	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	No
-	VII.E5.A-413	3.3-1, 137	Tanks within the scope of AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	Steel, stainless steel, aluminum	Raw water, waste water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, “Outdoor and Large Atmospheric Metallic Storage Tanks”	No
D	VII.E5.A-405	-	-	-	-	-	-	-
D	VII.E5.A-425	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.E5.A-426	-	-	-	-	-	-	-
D	VII.E5.A-456	-	-	-	-	-	-	-
D	VII.E5.A-462	-	-	-	-	-	-	-
D	VII.E5.A-469	-	-	-	-	-	-	-
D	VII.E5.A-537	-	-	-	-	-	-	-
D	VII.E5.A-548	-	-	-	-	-	-	-
D	VII.E5.A-749	-	-	-	-	-	-	-
D	VII.E5.A-754b	-	-	-	-	-	-	-
D	VII.E5.A-755	-	-	-	-	-	-	-
D	VII.E5.AP-273	-	-	-	-	-	-	-
D	VII.E5.AP-274	-	-	-	-	-	-	-
D	VII.E5.AP-280	-	-	-	-	-	-	-

AMP = aging management program; HDPE = High Density Polyethylene; MIC = microbiologically influenced corrosion; PVC = polyvinyl chloride; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

F VENTILATION SYSTEMS

F1 CONTROL ROOM AREA VENTILATION SYSTEM

Systems, Structures, and Components

This section discusses the control room area ventilation system (with warm moist air as the normal environment), which contains ducts, piping and fittings, equipment frames and housings, flexible collars and seals, filters, and heating and cooling air handlers. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the control room area ventilation system are governed by Group B Quality Standards.

With respect to filters and seals, these items are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters and seals are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The system that interfaces with the control room area ventilation system is the auxiliary and radwaste area ventilation system (VII.F2). The heat exchanger coils receive their water from other systems, such as the hot water heating system or the chilled water cooling system.

Table F.1 Control Room Area Ventilation System

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F1.A-781a	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.A-781b	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.A-781c	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.AP-99a	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.AP-99b	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.AP-99c	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
							Ducting Components"	
-	VII.F1.A-08	3.3-1, 090	Ducting, ducting components (Internal surfaces)	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (for drip pans and drain lines only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.A-788a	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.A-788b	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.A-788c	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.A-788d	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
							Components, Heat Exchangers, and Tanks"	
-	VII.F1.A-771a	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.A-771b	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.A-771c	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.A-771d	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F1.AP-203	3.3-1, 046	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F1.AP-65	3.3-1, 072	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.F1.A-770a	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.A-770b	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.A-770c	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.A-770d	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F1.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F1.A-417	3.3-1, 096b	Heat exchanger components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F1.AP-205	3.3-1, 050	Heat exchanger tubes	Copper Alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F1.A-565	3.3-1, 161	Heat exchanger tubes	Copper alloy	Condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.AP-204	3.3-1, 050	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F1.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F1.A-767	3.3-1, 238	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F1.A-778	3.3-1, 249	Heat exchanger tubes internal to components	Steel	Air – outdoor, air – indoor uncontrolled, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.A-419	3.3-1, 096a	Heat exchanger tubes internal to components	Steel, stainless steel, copper alloy, aluminum, titanium	Air, condensation (external)	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.A-794	3.3-1, 260	Heating, ventilation, and air conditioning closure bolting	Metallic	Air, condensation	Loss of material due to general (where applicable), pitting, crevice corrosion; cracking due to SCC, loss of preload	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F1.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F1.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.F1.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.F1.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.A-748	3.3-1, 219	Piping, piping components	Stainless steel	Steam	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F1.A-567	3.3-1, 170	Piping, piping components	Stainless steel	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
							AMP XI.M32, "One-Time Inspection"	
-	VII.F1.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F1.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting,	AMP XI.M39, "Lubricating Oil Analysis," and	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
						crevice corrosion, MIC	AMP XI.M32, "One-Time Inspection"	
-	VII.F1.A-566	3.3-1, 169	Piping, piping components	Steel, copper alloy	Steam	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F1.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.A-722	3.3-1, 157	Piping, piping components, heat	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
			exchanger components				Surfaces in Miscellaneous Piping and Ducting Components"	
-	VII.F1.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.F1.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.F1.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F1.AP-103	3.3-1, 096	Piping, piping components, seals	Elastomer	Air, raw water, waste water	Loss of material due to wear; flow blockage due to fouling (raw water, waste water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F1.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
							Exchangers, and Tanks"	
-	VII.F1.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F1.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F1.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F1.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F1.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
							Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	
-	VII.F1.AP-202	3.3-1, 045	Piping, piping components, tanks	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F1.A-26	3.3-1, 055	Piping, piping components, tanks	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
D	VII.F1.A-10	-	-	-	-	-	-	-
D	VII.F1.A-105	-	-	-	-	-	-	-
D	VII.F1.A-400	-	-	-	-	-	-	-
D	VII.F1.A-405	-	-	-	-	-	-	-
D	VII.F1.A-415	-	-	-	-	-	-	-
D	VII.F1.A-418	-	-	-	-	-	-	-
D	VII.F1.A-714a	-	-	-	-	-	-	-
D	VII.F1.A-714b	-	-	-	-	-	-	-
D	VII.F1.A-714c	-	-	-	-	-	-	-
D	VII.F1.A-733	-	-	-	-	-	-	-
D	VII.F1.A-749	-	-	-	-	-	-	-
D	VII.F1.A-750	-	-	-	-	-	-	-
D	VII.F1.A-772a	-	-	-	-	-	-	-
D	VII.F1.A-772b	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.F1.A-772c	-	-	-	-	-	-	-
D	VII.F1.A-772d	-	-	-	-	-	-	-
D	VII.F1.A-790a	-	-	-	-	-	-	-
D	VII.F1.A-790b	-	-	-	-	-	-	-
D	VII.F1.AP-102	-	-	-	-	-	-	-
D	VII.F1.AP-109	-	-	-	-	-	-	-
D	VII.F1.AP-113	-	-	-	-	-	-	-
D	VII.F1.AP-142	-	-	-	-	-	-	-
D	VII.F1.AP-41	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

F2 AUXILIARY AND RADWASTE AREA VENTILATION SYSTEM

Systems, Structures, and Components

This section discusses the auxiliary and radwaste area ventilation systems (with warm moist air as the normal environment) and contains ducts, piping and fittings, equipment frames and housings, flexible collars and seals, filters, and heating and cooling air handlers. Based on Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components that compose the auxiliary and radwaste area ventilation system are governed by Group B Quality Standards.

With respect to filters and seals, these items are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters and seals are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the auxiliary and radwaste area ventilation system are the control room area ventilation system (VII.F1) and the diesel generator building ventilation system (VII.F4). The heat exchanger coils receive their water from other systems, such as the hot water heating system or the chilled water cooling system.

1 **Table F.2 Auxiliary and Radwaste Area Ventilation System**

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-781a	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.A-781b	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F2.A-781c	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F2.AP-99a	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.AP-99b	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.AP-99c	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F2.A-08	3.3-1, 090	Ducting, ducting components (Internal surfaces)	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (for drip pans and drain lines only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F2.A-788a	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.A-788b	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F2.A-788c	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-788d	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
--	VII.F2.A-771a	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
	VII.F2.A-771b	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F2.A-771c	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-771d	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F2.A-770a	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.A-770b	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F2.A-770c	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-770d	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F2.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F2.A-417	3.3-1, 096b	Heat exchanger components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F2.AP-205	3.3-1, 050	Heat exchanger tubes	Copper Alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F2.A-565	3.3-1, 161	Heat exchanger tubes	Copper alloy	Condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.AP-204	3.3-1, 050	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F2.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F2.A-767	3.3-1, 238	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F2.A-778	3.3-1, 249	Heat exchanger tubes internal to components	Steel	Air – outdoor, air – indoor uncontrolled, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F2.A-419	3.3-1, 096a	Heat exchanger tubes internal to components	Steel, stainless steel, copper alloy, aluminum, titanium	Air, condensation (external)	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-794	3.3-1, 260	HVAC closure bolting	Metallic	Air, condensation	Loss of material due to general (where applicable), pitting, crevice corrosion; cracking due to SCC, loss of preload	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F2.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F2.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F2.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.F2.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.F2.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F2.A-748	3.3-1, 219	Piping, piping components	Stainless steel	Steam	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F2.A-567	3.3-1, 170	Piping, piping components	Stainless steel	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F2.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F2.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F2.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F2.A-566	3.3-1, 169	Piping, piping components	Steel, copper alloy	Steam	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F2.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F2.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.F2.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/lining	Raw water, treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.F2.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.AP-103	3.3-1, 096	Piping, piping components, seals	Elastomer	Air, raw water, waste water	Loss of material due to wear; flow blockage due to fouling (raw water, waste water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F2.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F2.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F2.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F2.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F2.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F2.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F2.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F2.AP-202	3.3-1, 045	Piping, piping components, tanks	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F2.A-26	3.3-1, 055	Piping, piping components, tanks	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
D	VII.F2.A-10	-	-	-	-	-	-	-

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.F2.A-105	-	-	-	-	-	-	-
D	VII.F2.A-400	-	-	-	-	-	-	-
D	VII.F2.A-405	-	-	-	-	-	-	-
D	VII.F2.A-415	-	-	-	-	-	-	-
D	VII.F2.A-418	-	-	-	-	-	-	-
D	VII.F2.A-714a	-	-	-	-	-	-	-
D	VII.F2.A-714b	-	-	-	-	-	-	-
D	VII.F2.A-714c	-	-	-	-	-	-	-
D	VII.F2.A-733	-	-	-	-	-	-	-
D	VII.F2.A-749	-	-	-	-	-	-	-
D	VII.F2.A-750	-	-	-	-	-	-	-
D	VII.F2.A-772a	-	-	-	-	-	-	-
D	VII.F2.A-772b	-	-	-	-	-	-	-
D	VII.F2.A-772c	-	-	-	-	-	-	-
D	VII.F2.A-772d	-	-	-	-	-	-	-
D	VII.F2.A-790a	-	-	-	-	-	-	-
D	VII.F2.A-790b	-	-	-	-	-	-	-
D	VII.F2.AP-102	-	-	-	-	-	-	-
D	VII.F2.AP-109	-	-	-	-	-	-	-
D	VII.F2.AP-113	-	-	-	-	-	-	-
D	VII.F2.AP-142	-	-	-	-	-	-	-
D	VII.F2.AP-41	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

F3 PRIMARY CONTAINMENT HEATING AND VENTILATION SYSTEM

Systems, Structures, and Components

This section discusses the primary containment heating and ventilation system (with warm moist air as the normal environment), which contains ducts, piping and fittings, equipment frames and housings, flexible collars and seals, filters, and heating and cooling air handlers. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the primary containment heating and ventilation system are governed by Group C Quality Standards.

Filters and seals are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters and seals are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the primary containment heating and ventilation system are the closed-cycle cooling water system (VII.C2) and the pressurized water reactor and boiling water reactor containments (II.A and II.B, respectively). The heat exchanger coils receive their water from other systems, such as the hot water heating system or the chilled water cooling system.

Table F.3 Primary Containment Heating and Ventilation System

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-781a	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F3.A-781b	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F3.A-781c	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F3.AP-99a	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F3.AP-99b	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.AP-99c	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F3.A-08	3.3-1, 090	Ducting, ducting components (Internal surfaces)	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (for drip pans and drain lines only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.A-788a	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F3.A-788b	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F3.A-788c	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-788d	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F3.A-771a	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F3.A-771b	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F3.A-771c	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-771d	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F3.AP-203	3.3-1, 046	Heat exchanger components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F3.AP-65	3.3-1, 072	Heat exchanger components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.F3.A-770a	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F3.A-770b	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-770c	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F3.A-770d	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F3.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F3.A-417	3.3-1, 096b	Heat exchanger components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F3.AP-205	3.3-1, 050	Heat exchanger tubes	Copper Alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-565	3.3-1, 161	Heat exchanger tubes	Copper alloy	Condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.AP-204	3.3-1, 050	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F3.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F3.A-767	3.3-1, 238	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F3.A-778	3.3-1, 249	Heat exchanger tubes internal to components	Steel	Air – outdoor, air – indoor uncontrolled, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-419	3.3-1, 096a	Heat exchanger tubes internal to components	Steel, stainless steel, copper alloy, aluminum, titanium	Air, condensation (external)	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.A-794	3.3-1, 260	HVAC closure bolting	Metallic	Air, condensation	Loss of material due to general (where applicable), pitting, crevice corrosion; cracking due to SCC, loss of preload	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F3.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F3.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.F3.A-50	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F3.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F3.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F3.A-748	3.3-1, 219	Piping, piping components	Stainless steel	Steam	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F3.A-567	3.3-1, 170	Piping, piping components	Stainless steel	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F3.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F3.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F3.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F3.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-566	3.3-1, 169	Piping, piping components	Steel, copper alloy	Steam	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F3.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.F3.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.AP-103	3.3-1, 096	Piping, piping components, seals	Elastomer	Air, raw water, waste water	Loss of material due to wear; flow blockage due to fouling (raw water, waste water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F3.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
	VII.F3.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F3.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F3.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F3.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F3.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F3.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F3.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F3.AP-202	3.3-1, 045	Piping, piping components, tanks	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F3.A-26	3.3-1, 055	Piping, piping components, tanks	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
D	VII.F3.A-10	-	-	-	-	-	-	-

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.F3.A-105	-	-	-	-	-	-	-
D	VII.F3.A-400	-	-	-	-	-	-	-
D	VII.F3.A-405	-	-	-	-	-	-	-
D	VII.F3.A-415	-	-	-	-	-	-	-
D	VII.F3.A-418	-	-	-	-	-	-	-
D	VII.F3.A-733	-	-	-	-	-	-	-
D	VII.F3.A-749	-	-	-	-	-	-	-
D	VII.F3.A-772a	-	-	-	-	-	-	-
D	VII.F3.A-772b	-	-	-	-	-	-	-
D	VII.F3.A-772c	-	-	-	-	-	-	-
D	VII.F3.A-772d	-	-	-	-	-	-	-
D	VII.F3.A-790a	-	-	-	-	-	-	-
D	VII.F3.A-790b	-	-	-	-	-	-	-
D	VII.F3.AP-102	-	-	-	-	-	-	-
D	VII.F3.AP-109	-	-	-	-	-	-	-
D	VII.F3.AP-113	-	-	-	-	-	-	-
D	VII.F3.AP-142	-	-	-	-	-	-	-
D	VII.F3.AP-41	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

F4 DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Systems, Structures, and Components

This section discusses the diesel generator building ventilation system (with warm moist air as the normal environment), which contains ducts, piping and fittings, equipment frames and housings, flexible collars and seals, and heating and cooling air handlers. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the diesel generator building ventilation system are governed by Group C Quality Standards.

Filters and seals are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system seals are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The system that interfaces with the diesel generator building system is the auxiliary and radwaste area ventilation system (VII.F2). The heat exchanger coils receive their water from other systems, such as the hot water heating system or the chilled water cooling system.

Table F.4 Diesel Generator Building Ventilation System

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-781a	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F4.A-781b	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.A-781c	3.3-1, 094a	Ducting, ducting components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F4.AP-99a	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F4.AP-99b	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.AP-99c	3.3-1, 094	Ducting, ducting components	Stainless steel	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F4.A-08	3.3-1, 090	Ducting, ducting components (Internal surfaces)	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (for drip pans and drain lines only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F4.A-788a	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F4.A-788b	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.A-788c	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-788d	3.3-1, 254	Heat exchanger components	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F4.A-771a	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F4.A-771b	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.A-771c	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-771d	3.3-1, 242	Heat exchanger components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F4.A-770a	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F4.A-770b	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.A-770c	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-770d	3.3-1, 241	Heat exchanger components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F4.AP-189	3.3-1, 046	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F4.A-417	3.3-1, 096b	Heat exchanger components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F4.AP-205	3.3-1, 050	Heat exchanger tubes	Copper Alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F4.A-565	3.3-1, 161	Heat exchanger tubes	Copper alloy	Condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.AP-204	3.3-1, 050	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F4.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F4.A-767	3.3-1, 238	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F4.A-778	3.3-1, 249	Heat exchanger tubes internal to components	Steel	Air – outdoor, air – indoor uncontrolled, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F4.A-419	3.3-1, 096a	Heat exchanger tubes internal to components	Steel, stainless steel, copper alloy, aluminum, titanium	Air, condensation (external)	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-794	3.3-1, 260	Heating, ventilation, and air conditioning closure bolting	Metallic	Air, condensation	Loss of material due to general (where applicable), pitting, crevice corrosion; cracking due to SCC, loss of preload	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.F4.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F4.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F4.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.F4.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.F4.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F4.A-748	3.3-1, 219	Piping, piping components	Stainless steel	Steam	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F4.A-567	3.3-1, 170	Piping, piping components	Stainless steel	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F4.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.F4.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F4.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-566	3.3-1, 169	Piping, piping components	Steel, copper alloy	Steam	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.F4.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F4.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F4.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.F4.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/lining	Raw water, treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F4.AP-103	3.3-1, 096	Piping, piping components, seals	Elastomer	Air, raw water, waste water	Loss of material due to wear; flow blockage due to fouling (raw water, waste water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.F4.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F4.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F4.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.F4.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.F4.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.F4.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F4.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.F4.AP-202	3.3-1, 045	Piping, piping components, tanks	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.F4.A-26	3.3-1, 055	Piping, piping components, tanks	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
D	VII.F4.A-10	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.F4.A-105	-	-	-	-	-	-	-
D	VII.F4.A-400	-	-	-	-	-	-	-
D	VII.F4.A-405	-	-	-	-	-	-	-
D	VII.F4.A-415	-	-	-	-	-	-	-
D	VII.F4.A-418	-	-	-	-	-	-	-
D	VII.F4.A-714a	-	-	-	-	-	-	-
D	VII.F4.A-714b	-	-	-	-	-	-	-
D	VII.F4.A-714c	-	-	-	-	-	-	-
D	VII.F4.A-733	-	-	-	-	-	-	-
D	VII.F4.A-749	-	-	-	-	-	-	-
D	VII.F4.A-750	-	-	-	-	-	-	-
D	VII.F4.A-772a	-	-	-	-	-	-	-
D	VII.F4.A-772b	-	-	-	-	-	-	-
D	VII.F4.A-772c	-	-	-	-	-	-	-
D	VII.F4.A-772d	-	-	-	-	-	-	-
D	VII.F4.A-790a	-	-	-	-	-	-	-
D	VII.F4.A-790b	-	-	-	-	-	-	-
D	VII.F4.AP-102	-	-	-	-	-	-	-
D	VII.F4.AP-109	-	-	-	-	-	-	-
D	VII.F4.AP-113	-	-	-	-	-	-	-
D	VII.F4.AP-142	-	-	-	-	-	-	-
D	VII.F4.AP-41	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

G FIRE PROTECTION

Systems, Structures, and Components

This section discusses the fire protection systems for both BWRs and PWRs, which consist of several Class 1 structures, mechanical systems, and electrical components. The Class 1 structures include the intake structure, the turbine building, the reactor building, the auxiliary building, the diesel generator building, and the primary containment. Structural assemblies and components include (1) fire barrier walls, (2) ceilings, (3) floors, (4) fire doors, (5) fire barrier penetration seals, (6) fire dampers, and (7) fire-resistant material (structural steel coating and insulation). Mechanical systems include the high-pressure service water system, water-based fire suppression systems and gaseous, clean agent, and foam extinguishing systems, the reactor coolant pump oil collection system, and the diesel engine for the diesel fire pump. Mechanical components include (1) buried underground, and aboveground piping and piping components, (2) filters, (3) fire hydrants, (4) mulsifiers, (5) fire pumps, (6) sprinklers/spray nozzles, (7) strainers, (8) valves (including containment isolation valves), (9) standpipe, and hose stations, (10) tanks, (11) drains, and (12) electric raceway fire barriers, (i.e., fire wraps [electric raceway fire barriers are non-structural fire-rated assemblies that protect the electrical components and cables they enclose]).

The fire protection licensing and design basis under subsequent license renewal should not reduce requirements in existing approved fire protection programs. However, the Fire Protection and Fire Water System programs could include additional tests and inspections during the subsequent period of extended operation beyond that in approved fire protection programs. The scope of systems, structures, and components (SSCs) included in the Fire Protection and Fire Water System programs should consider interfaces between rooms containing safety-related and nonsafety-related SSCs. For example, a nonsafety-related damper may have a function to close to prevent fire propagation into a room containing safety-related SSCs.

With respect to filters, seals, portable fire extinguishers, and fire hoses, these items are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters, seals, portable fire extinguishers, and fire hoses are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review (AMR) under Title 10 of the *Code of Federal Regulations* (10 CFR) 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association codes and standards for fire protection equipment.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to 10 CFR 54.21(a)(1), they are not subject to an AMR. Pump and valve casings are passive and long-lived, and therefore would be subject to an AMR.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations where aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation are included in VII.J.

The system piping includes all pipe sizes, including instrument piping and tubing.

System Interfaces

The systems and structures that interface with the fire protection system include various Class 1 structures and component supports (III.A and III.B), the electrical components (VI.A and VI.B), the open-cycle cooling water system (service water system) (VII.C1),the closed-cycle cooling water system (VII.C2), the compressed air system (VII.D), ventilation systems (VII.F1 – VII.F4), and the diesel fuel oil system (VII.H1).

Table G.1 Fire Protection

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-532	3.3-1, 193	Any	Steel	Raw water, raw water (potable)	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.G.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VII.G.A-19	3.3-1, 057	Fire barrier penetration seals	Elastomer	Air, condensation	Hardening, loss of strength, shrinkage due to elastomer degradation	AMP XI.M26, "Fire Protection"	No
M	VII.G.A-789	3.3-1, 255	Fire damper housings	Metallic	Air	Loss of material due to general, pitting, crevice corrosion; cracking due to stress corrosion cracking (SCC)	AMP XI.M26, "Fire Protection"	No
-	VII.G.AP-149	3.3-1, 063	Fire hydrants	Steel	Air – outdoor, raw water, raw water (potable), treated water	Loss of material due to general, pitting, crevice corrosion; flow blockage due to fouling (raw water, raw water (potable) only)	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-21	3.3-1, 059	Fire rated doors	Steel	Air	Loss of material due to wear	AMP XI.M26, "Fire Protection"	No
-	VII.G.A-623	3.3-1, 185	Fire water storage tanks	Aluminum	Air, condensation, soil, concrete, raw water, raw water (potable), treated water	Cracking due to SCC	AMP XI.M27, "Fire Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-744	3.3-1, 215	Fire water storage tanks	Aluminum	Air, condensation, soil, concrete, raw water, raw water (potable), treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-745	3.3-1, 216	Fire water storage tanks	Stainless steel	Air, condensation, soil, concrete	Cracking due to SCC	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-747	3.3-1, 218	Fire water storage tanks	Stainless steel	Air, condensation, soil, concrete, raw water, raw water (potable), treated water	Loss of material due to pitting, crevice corrosion, MIC (water and soil environment only)	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-412	3.3-1, 136	Fire water storage tanks	Steel	Air, condensation, soil, concrete, raw water, raw water (potable), treated water	Loss of material due to general, pitting, crevice corrosion, MIC (raw water, raw water (potable), treated water, soil only)	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-650	3.3-1, 198	Fire water system piping, piping components, heat exchanger, heat exchanger components with only a leakage boundary (spatial) or structural integrity (attached) intended function	Metallic	Any except soil, concrete	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (all metallic materials except aluminum; in liquid environments only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-649	3.3-1, 197	Fire water system piping, piping components, heat exchanger, heat exchanger components with only a leakage boundary (spatial) or structural integrity (attached) intended function	Metallic	Any external environment except soil, concrete	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.G.AP-150	3.3-1, 058	Halon/carbon dioxide fire suppression system piping, piping components	Steel	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M26, "Fire Protection"	No
-	VII.G.A-565	3.3-1, 161	Heat exchanger tubes	Copper alloy	Condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.G.AP-187	3.3-1, 042	Heat exchanger tubes	Stainless steel, copper alloy, titanium	Raw water, raw water (potable), treated water	Cracking due to SCC (titanium only), reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	VII.G.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/lining	Closed-cycle cooling water, raw water, raw water (potable), treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.G.AP-129	3.3-1, 071	Piping, piping components	Aluminum	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.AP-129a	3.3-1, 071	Piping, piping components	Aluminum	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.AP-162	3.3-1, 099	Piping, piping components	Aluminum	Lubricating oil	Loss of material due to pitting, crevice corrosion	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.AP-180	3.3-1, 065	Piping, piping components	Aluminum	Raw water, treated water, raw water (potable)	Loss of material due to pitting, crevice corrosion; flow blockage due to fouling (raw water only)	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-451a	3.3-1, 189	Piping, piping components	Aluminum	Air, condensation, raw water, raw water (potable), waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.G.A-451b	3.3-1, 189	Piping, piping components	Aluminum	Air, condensation, raw water, raw water (potable), waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.G.A-451c	3.3-1, 189	Piping, piping components	Aluminum	Air, condensation, raw water, raw water (potable), waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-451d	3.3-1, 189	Piping, piping components	Aluminum	Air, condensation, raw water, raw water (potable), waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.G.AP-132	3.3-1, 069	Piping, piping components	Copper alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.AP-132a	3.3-1, 069	Piping, piping components	Copper alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.G.AP-133	3.3-1, 099	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.AP-197	3.3-1, 064	Piping, piping components	Copper alloy	Raw water, treated water, raw water (potable)	Loss of material due to general (raw water, raw water (potable) only), pitting, crevice corrosion, MIC; flow blockage due to fouling (raw water only)	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-47	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water, raw water (potable), treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.G.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.G.A-51	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Raw water, raw water (potable), treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.G.A-02	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.G.AP-31	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.G.A-458	3.3-1, 172	Piping, piping components	PVC	Air – outdoor	Reduction in impact strength due to photolysis	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.G.A-787b	3.3-1, 253	Piping, piping components	PVC	Raw water, raw water (potable), treated water	Loss of material due to wear (not applicable in low flow environments); flow blockage due to fouling (raw water only)	AMP XI.M27, "Fire Water System"	No
--	VII.G.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
	VII.G.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.G.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.G.AP-136	3.3-1, 071	Piping, piping components	Stainless steel	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.AP-136a	3.3-1, 071	Piping, piping components	Stainless steel	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.AP-138	3.3-1, 100	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.A-55	3.3-1, 066	Piping, piping components	Stainless steel	Raw water, treated water, raw water (potable)	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling (raw water only)	AMP XI.M27, "Fire Water System"	No
-	VII.G.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.G.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.G.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.G.AP-143	3.3-1, 089	Piping, piping components	Steel	Condensation (internal)	Loss of material due to general, pitting, crevice corrosion	AMP XI.M27, "Fire Water System"	No
-	VII.G.AP-234	3.3-1, 070	Piping, piping components	Steel	Fuel oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.G.A-33	3.3-1, 064	Piping, piping components	Steel	Raw water, treated water, raw water (potable)	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling (raw water, raw water (potable) only)	AMP XI.M27, "Fire Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-404	3.3-1, 131	Piping, piping components	Steel, stainless steel, copper alloy, aluminum	Air, condensation	Flow blockage due to fouling	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-647	3.3-1, 195	Piping, piping components	Concrete, concrete cylinder piping, reinforced concrete, asbestos cement, cementitious	Raw water, treated water, raw water (potable)	Cracking due to chemical reaction, weathering, settlement, or corrosion of reinforcement (reinforced concrete only); loss of material due to delamination, exfoliation, spalling, popout, scaling, or cavitation; flow blockage due to fouling (raw water only)	AMP XI.M27, "Fire Water System"	No
M	VII.G.A-648	3.3-1, 196	Piping, piping components	HDPE	Raw water, treated water, raw water (potable)	Cracking, blistering, loss of material due to exposure to radiation, temperature, or moisture; flow blockage due to fouling (raw water only)	AMP XI.M27, "Fire Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.G.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.G.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M27, "Fire Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-416	3.3-1, 138	Piping, piping components, heat exchangers with internal coatings/linings	Any material with an internal coating/ lining	Raw water, raw water (potable), treated water, lubricating oil	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.G.A-414	3.3-1, 139	Piping, piping components, heat exchangers with internal coatings/linings	Any material with an internal coating/ lining	Raw water, raw water (potable), treated water, lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.G.A-504	3.3-1, 085	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.AP-76	3.3-1, 096	Piping, piping components, seals	Elastomer	Air, raw water, raw water (potable), treated water	Loss of material due to wear; flow blockage due to fouling (raw water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.G.A-729	3.3-1, 085	Piping, piping components, seals	Elastomer	Gas	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.G.AP-75	3.3-1, 085	Piping, piping components, seals	Elastomer	Raw water, raw water (potable), treated water	Hardening or loss of strength due to elastomer degradation; flow blockage due to fouling (raw water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	VII.G.A-644	3.3-1, 175	Piping, piping components, tanks	Fiberglass	Raw water, raw water (potable), treated water	Cracking, blistering, loss of material due to exposure to radiation, temperature, or moisture; flow blockage due to fouling (raw water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-645	3.3-1, 176	Piping, piping components, tanks	Fiberglass	Raw water, raw water (potable), treated water	Loss of material due to wear; flow blockage due to fouling (raw water only)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	VII.G.A-400c	3.3-1, 127	Piping, piping components, tanks	Metallic	Raw water, raw water (potable), treated water	Loss of material due to recurring internal corrosion	AMP XI.M27, "Fire Water System"	Yes
-	VII.G.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.G.AP-234a	3.3-1, 070	Piping, piping components, tanks	Steel	Fuel oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.G.AP-117	3.3-1, 250	Reactor coolant pump oil collection system: piping, piping components	Steel	Lubricating oil (waste oil)	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M32, "One-Time Inspection"	No
-	VII.G.AP-116	3.3-1, 250	Reactor coolant pump oil collection system: tanks	Steel	Lubricating oil (waste oil)	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.G.A-403	3.3-1, 130	Sprinklers	Metallic	Air, condensation, raw water, raw water (potable), treated water	Loss of material due to general (where applicable), pitting, crevice corrosion, MIC (except for aluminum, and in raw water, raw water (potable), treated water only), flow blockage due to fouling	AMP XI.M27, "Fire Water System"	No
-	VII.G.A-626	3.3-1, 179	Structural fire barrier walls	Masonry walls	Air	Cracking due to restraint shrinkage, creep, aggressive environment; loss of material (spalling, scaling) and cracking due to freeze-thaw	AMP XI.M26, "Fire Protection," and AMP XI.S5, "Masonry Walls"	No
-	VII.G.A-90	3.3-1, 060	Structural fire barriers: walls, ceilings and floors	Reinforced concrete	Air	Cracking due to chemical reaction, weathering, settlement, or corrosion of reinforcement; loss of material due to delamination, exfoliation, spalling, popout, or scaling	AMP XI.M26, "Fire Protection," and AMP XI.S6, "Structures Monitoring"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VII.G.A-805	3.3-1, 267	Fireproofing; fire barriers	Subliming compounds (Thermo-lag®, Darmatt™, 3M™ Interam™, and other similar materials)	Air	Loss of material due to abrasion, flaking, vibration; cracking/ delamination due to chemical reaction, settlement; change in material properties due to gamma irradiation exposure; separation	AMP XI.M26, "Fire Protection"	No
N	VII.G.A-806	3.3-1, 268	Fireproofing; fire barriers	Cement-itious coatings (Pyrocrete, BIO™ K-10 Mortar, Cafecote, and other similar materials)	Air	Loss of material due to abrasion, exfoliation, elevated temperature, flaking, spalling; cracking/ delamination due to chemical reaction, elevated temperature, settlement, vibration; change in material properties due to elevated temperature, gamma irradiation exposure; separation	AMP XI.M26, "Fire Protection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VII.G.A-807	3.3-1, 269	Fireproofing; fire barriers	Silicates (Marinite®, Kaowool™, Cerafiber®, Cera® blanket, or other similar materials)	Air	Loss of material due to abrasion, flaking; cracking/ delamination due to settlement; change in material properties due to gamma irradiation exposure; separation	AMP XI.M26, “Fire Protection”	No
D	VII.G.A-20	-	-	-	-	-	-	-
D	VII.G.A-22	-	-	-	-	-	-	-
D	VII.G.A-23	-	-	-	-	-	-	-
D	VII.G.A-402	-	-	-	-	-	-	-
D	VII.G.A-405	-	-	-	-	-	-	-
D	VII.G.A-425	-	-	-	-	-	-	-
D	VII.G.A-426	-	-	-	-	-	-	-
D	VII.G.A-456	-	-	-	-	-	-	-
D	VII.G.A-462	-	-	-	-	-	-	-
D	VII.G.A-627	-	-	-	-	-	-	-
D	VII.G.A-637	-	-	-	-	-	-	-
D	VII.G.A-641	-	-	-	-	-	-	-
D	VII.G.A-651	-	-	-	-	-	-	-
D	VII.G.A-654	-	-	-	-	-	-	-
D	VII.G.A-714a	-	-	-	-	-	-	-
D	VII.G.A-714b	-	-	-	-	-	-	-
D	VII.G.A-714c	-	-	-	-	-	-	-
D	VII.G.A-746	-	-	-	-	-	-	-
D	VII.G.A-749	-	-	-	-	-	-	-
D	VII.G.A-750	-	-	-	-	-	-	-
D	VII.G.A-786	-	-	-	-	-	-	-
D	VII.G.A-790a	-	-	-	-	-	-	-
D	VII.G.A-790b	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.G.A-91	-	-	-	-	-	-	-
D	VII.G.A-92	-	-	-	-	-	-	-
D	VII.G.A-93	-	-	-	-	-	-	-
D	VII.G.A-95	-	-	-	-	-	-	-
D	VII.G.AP-137	-	-	-	-	-	-	-
D	VII.G.AP-198	-	-	-	-	-	-	-
D	VII.G.AP-209e	-	-	-	-	-	-	-
D	VII.G.AP-40	-	-	-	-	-	-	-
D	VII.G.AP-41	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

H DIESEL FUEL OIL AND EMERGENCY DIESEL GENERATOR SYSTEMS

H1 DIESEL FUEL OIL SYSTEM

Systems, Structures, and Components

This section discusses the diesel fuel oil system, which consists of aboveground and underground piping, valves, pumps, and tanks. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the diesel fuel oil system are governed by Group C Quality Standards.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the diesel fuel oil system are the fire protection (VII.G) and emergency diesel generator systems (VII.H2).

Table H.1 Diesel Fuel Oil System

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.H1.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.H1.AP-129	3.3-1, 071	Piping, piping components	Aluminum	Fuel oil	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H1.AP-129a	3.3-1, 071	Piping, piping components	Aluminum	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.H1.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H1.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.AP-132	3.3-1, 069	Piping, piping components	Copper alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H1.AP-132a	3.3-1, 069	Piping, piping components	Copper alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.H1.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.H1.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.H1.A-02	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.H1.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to stress corrosion cracking (SCC)	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H1.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H1.AP-136	3.3-1, 071	Piping, piping components	Stainless steel	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H1.AP-136a	3.3-1, 071	Piping, piping components	Stainless steel	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.H1.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H1.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H1.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.AP-105	3.3-1, 070	Piping, piping components	Steel	Fuel oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H1.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H1.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H1.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Fuel oil	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Fuel oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.H1.A-660	3.3-1, 085	Piping, piping components, seals	Elastomer	Fuel oil	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H1.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H1.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H1.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H1.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H1.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.AP-105a	3.3-1, 070	Piping, piping components, tanks	Steel	Fuel oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-756a	3.3-1, 227	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.H1.A-756b	3.3-1, 227	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H1.A-756c	3.3-1, 227	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.A-482a	3.3-1, 186	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-482b	3.3-1, 186	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H1.A-482c	3.3-1, 186	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.A-760a	3.3-1, 231	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.H1.A-760b	3.3-1, 231	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-760c	3.3-1, 231	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.A-759	3.3-1, 230	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VII.H1.A-758	3.3-1, 229	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VII.H1.A-757a	3.3-1, 228	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H1.A-757b	3.3-1, 228	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H1.A-757c	3.3-1, 228	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H1.A-401	3.3-1, 128	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel	Soil, concrete, air, condensation, raw water	Loss of material due to general, pitting, crevice corrosion, MIC (soil, raw water only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VII.H1.A-413	3.3-1, 137	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel, stainless steel, aluminum	Treated water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
D	VII.H1.A-24	-	-	-	-	-	-	-
D	VII.H1.A-400	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Process (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.H1.A-402	-	-	-	-	-	-	-
D	VII.H1.A-405	-	-	-	-	-	-	-
D	VII.H1.A-425	-	-	-	-	-	-	-
D	VII.H1.A-426	-	-	-	-	-	-	-
D	VII.H1.A-456	-	-	-	-	-	-	-
D	VII.H1.A-565	-	-	-	-	-	-	-
D	VII.H1.A-654	-	-	-	-	-	-	-
D	VII.H1.A-667	-	-	-	-	-	-	-
D	VII.H1.A-714a	-	-	-	-	-	-	-
D	VII.H1.A-714b	-	-	-	-	-	-	-
D	VII.H1.A-714c	-	-	-	-	-	-	-
D	VII.H1.A-749	-	-	-	-	-	-	-
D	VII.H1.A-750	-	-	-	-	-	-	-
D	VII.H1.A-754c	-	-	-	-	-	-	-
D	VII.H1.A-755	-	-	-	-	-	-	-
D	VII.H1.A-95	-	-	-	-	-	-	-
D	VII.H1.AP-137	-	-	-	-	-	-	-
D	VII.H1.AP-209e	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

H2 EMERGENCY DIESEL GENERATOR SYSTEM

Systems, Structures, and Components

This section discusses the emergency diesel generator (EDG) system, which contains piping, valves, filters, mufflers, strainers, and tanks. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the EDG system are governed by Group C Quality Standards.

Filters and seals are to be addressed consistent with the NRC position on consumables, provided in the NRC letter from Christopher I. Grimes to Douglas J. Walters of the Nuclear Energy Institute, dated March 10, 2000. Specifically, components that function as system filters are typically replaced based on performance or condition monitoring that identifies whether they are at the end of their qualified lives and therefore may be excluded, on a plant-specific basis, from an aging management review under Title 10 of the *Code of Federal Regulations* 54.21(a)(1)(ii). As part of the methodology description, the application should identify the standards that are relied on for replacement, for example, National Fire Protection Association standards for fire protection equipment.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VII.I. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation are included in VII.J.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the EDG system include the diesel fuel oil system (VII.H1), the closed-cycle cooling water system (VII.C2) and the open-cycle cooling water system (VII.C1) for some plants.

Table H.2 Emergency Diesel Generator System

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-532	3.3-1, 193	Any	Steel	Raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
--	VII.H2.A-439	3.3-1, 193	Any	Steel	Treated water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
	VII.H2.AP-128	3.3-1, 083	Diesel engine exhaust piping, piping components	Stainless steel	Diesel exhaust	Cracking due to stress corrosion cracking (SCC)	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.AP-131	3.3-1, 098	Heat exchanger components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.AP-152a	3.3-1, 123	Heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.H2.AP-154	3.3-1, 101	Heat exchanger tubes	Aluminum	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-565	3.3-1, 161	Heat exchanger tubes	Copper alloy	Condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.AP-187	3.3-1, 042	Heat exchanger tubes	Stainless steel, copper alloy, titanium	Raw water	Cracking due to SCC (titanium only), reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.H2.A-791	3.3-1, 257	Heat exchanger tubes	Steel, stainless steel, copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.A-765	3.3-1, 236	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	VII.H2.A-795a	3.3-1, 261	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC, flow blockage due to fouling.	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VII.H2.A-415	3.3-1, 140	Piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.H2.AP-255	3.3-1, 048	Piping, piping components	Aluminum	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.H2.AP-129	3.3-1, 071	Piping, piping components	Aluminum	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.AP-129a	3.3-1, 071	Piping, piping components	Aluminum	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.H2.AP-162	3.3-1, 099	Piping, piping components	Aluminum	Lubricating oil	Loss of material due to pitting, crevice corrosion	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-793	3.3-1, 259	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.AP-130	3.3-1, 025	Piping, piping components	Aluminum	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.AP-199	3.3-1, 046	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VII.H2.AP-132	3.3-1, 069	Piping, piping components	Copper alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.AP-132a	3.3-1, 069	Piping, piping components	Copper alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.H2.AP-133	3.3-1, 099	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.AP-193	3.3-1, 034	Piping, piping components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.H2.AP-43	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.H2.A-47	3.3-1, 072	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.H2.A-743	3.3-1, 214	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.H2.A-51	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VII.H2.A-02	3.3-1, 072	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VII.H2.AP-209a	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H2.AP-209b	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.AP-209c	3.3-1, 004	Piping, piping components	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H2.AP-136	3.3-1, 071	Piping, piping components	Stainless steel	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.AP-136a	3.3-1, 071	Piping, piping components	Stainless steel	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
-	VII.H2.AP-138	3.3-1, 100	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.AP-55	3.3-1, 040	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.H2.AP-221a	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.AP-221b	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.H2.AP-221c	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H2.AP-221d	3.3-1, 006	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H2.AP-105	3.3-1, 070	Piping, piping components	Steel	Fuel oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.AP-127	3.3-1, 097	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VII.H2.AP-194	3.3-1, 037	Piping, piping components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.H2.AP-161a	3.3-1, 123	Piping, piping components	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VII.H2.AP-104	3.3-1, 088	Piping, piping components, diesel engine exhaust	Steel; stainless steel	Diesel exhaust	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.A-495	3.3-1, 159	Piping, piping components, ducting, ducting components	Fiberglass	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-797b	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.A-722	3.3-1, 157	Piping, piping components, heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.A-796a	3.3-1, 262	Piping, piping components, heat exchanger components	Titanium	Closed-cycle cooling water, treated water	Cracking due to SCC	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-416	3.3-1, 138	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.H2.A-414	3.3-1, 139	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Raw water, treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VII.H2.A-677	3.3-1, 085	Piping, piping components, seals	Elastomer	Lubricating oil	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.A-763a	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-763b	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.H2.A-763c	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H2.A-763d	3.3-1, 234	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H2.A-451a	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.H2.A-451b	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-451c	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.H2.A-451d	3.3-1, 189	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H2.AP-209d	3.3-1, 004	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.H2.AP-202	3.3-1, 045	Piping, piping components, tanks	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.H2.A-26	3.3-1, 055	Piping, piping components, tanks	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VII.H2.AP-105a	3.3-1, 070	Piping, piping components, tanks	Steel	Fuel oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M30, "Fuel Oil Chemistry"	No
N	VII.H2.A-799	3.3.1-265	Heat exchanger tubes	Steel	Fuel oil	Reduction of heat transfer due to fouling	AMP XI.M30, “Fuel Oil Chemistry,” and AMP XI.M32, One Time Inspection”	No
N	VII.H2.A-800	3.3.1-266	Heat exchanger tubes	Steel	Fuel oil	Reduction of heat transfer due to fouling	AMP XI.M30, “Fuel Oil Chemistry”	No
N	VII.H2.A-801	3.3-1, 071	Piping, piping components	Nickel Alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, “Fuel Oil Chemistry,” and AMP XI.M32, One Time Inspection”	No
N	VII.H2.A-802	3.3-1, 071	Piping, piping components	Nickel Alloy	Fuel oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M30, “Fuel Oil Chemistry”	No
D	VII.H2.A-23	-	-	-	-	-	-	-
D	VII.H2.A-400	-	-	-	-	-	-	-
D	VII.H2.A-405	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.H2.A-425	-	-	-	-	-	-	-
D	VII.H2.A-426	-	-	-	-	-	-	-
D	VII.H2.A-456	-	-	-	-	-	-	-
D	VII.H2.A-651	-	-	-	-	-	-	-
D	VII.H2.A-667	-	-	-	-	-	-	-
D	VII.H2.A-714a	-	-	-	-	-	-	-
D	VII.H2.A-714b	-	-	-	-	-	-	-
D	VII.H2.A-714c	-	-	-	-	-	-	-
D	VII.H2.A-733	-	-	-	-	-	-	-
D	VII.H2.A-749	-	-	-	-	-	-	-
D	VII.H2.A-750	-	-	-	-	-	-	-
D	VII.H2.A-790a	-	-	-	-	-	-	-
D	VII.H2.A-790b	-	-	-	-	-	-	-
D	VII.H2.AP-258	-	-	-	-	-	-	-
D	VII.H2.AP-40	-	-	-	-	-	-	-
D	VII.H2.AP-41	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

I EXTERNAL SURFACES OF COMPONENTS AND MISCELLANEOUS BOLTING

Systems, Structures, and Components

This section addresses the aging management programs for the degradation of external surfaces of structures and components, including closure bolting in the auxiliary systems in PWRs and BWRs. For the steel components in PWRs, this section addresses only boric acid corrosion of external surfaces as a result of dripping borated water that is leaking from an adjacent PWR component. Boric acid corrosion can also occur for steel components containing borated water due to leakage; such components and the related aging management programs are covered in the appropriate major plant sections in VII.

System Interfaces

The structures and components covered in this section belong to the auxiliary systems in PWRs and BWRs. (For example, see System Interfaces in VII.A1 to VII.H2 for details.)

Table I.1 External Surfaces of Components and Miscellaneous Bolting

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-04	3.3-1, 010	Closure bolting	High-strength steel	Air, soil, underground	Cracking due to stress corrosion cracking (SCC); cyclic loading	AMP XI.M18, "Bolting Integrity"	No
-	VII.I.AP-124	3.3-1, 015	Closure bolting	Metallic	Any, soil, underground	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No
-	VII.I.A-426	3.3-1, 145	Closure bolting	Stainless steel	Air, soil, concrete, underground, waste water	Cracking due to SCC	AMP XI.M18, "Bolting Integrity"	No
-	VII.I.AP-243	3.3-1, 108	Closure bolting	Stainless Steel, nickel alloy	Soil, concrete, underground	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.A-423	3.3-1, 142	Closure bolting	Stainless steel, steel, nickel alloy, copper alloy	Fuel oil, lubricating oil, treated water, treated borated water, raw water, waste water	Loss of material due to general (steel; copper alloy in raw water, waste water only), pitting, crevice corrosion, MIC (raw water, waste water environments only)	AMP XI.M18, "Bolting Integrity"	No
-	VII.I.AP-241	3.3-1, 109	Closure bolting	Steel	Soil, concrete, underground	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-03	3.3-1, 012	Closure bolting	Steel, stainless steel, nickel alloy	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M18, "Bolting Integrity"	No
-	VII.I.A-77	3.3-1, 078	External surfaces	Steel	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.A-79	3.3-1, 009	External surfaces	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	VII.I.AP-41	3.3-1, 080	Heat exchanger components	Steel	Air – indoor uncontrolled	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.AP-40	3.3-1, 080	Heat exchanger components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.A-716	3.3-1, 151	Heat exchanger tubes	Stainless steel, steel, aluminum, copper alloy, titanium	Air, condensation	Reduction of heat transfer due to fouling	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-762a	3.3-1, 233	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.I.A-762b	3.3-1, 233	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.I.A-762c	3.3-1, 233	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.I.A-762d	3.3-1, 233	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.A-774a	3.3-1, 245	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-774b	3.3-1, 245	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.I.A-774c	3.3-1, 245	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.I.A-774d	3.3-1, 245	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.A-734a	3.3-1, 205	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.I.A-734b	3.3-1, 205	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-734c	3.3-1, 205	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.I.A-734d	3.3-1, 205	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.A-761a	3.3-1, 232	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VII.I.A-761b	3.3-1, 232	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.I.A-761c	3.3-1, 232	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-761d	3.3-1, 232	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.A-405a	3.3-1, 132	Insulated piping, piping components, tanks	Steel, copper alloy (>15% Zn or >8% Al)	Air, condensation	Loss of material due to general (steel only), pitting, crevice corrosion; cracking due to SCC (copper alloy (>15% Zn or >8% Al) only)	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.A-405b	3.3-1, 132	Insulated tanks (within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks")	Steel	Air, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," or AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-704	3.3-1, 182	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.AP-173	3.3-1, 252	Piping, piping components	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.AP-253	3.3-1, 073	Piping, piping components	Concrete, concrete cylinder piping, reinforced concrete, asbestos cement, cementitious	Air – outdoor	Cracking due to chemical reaction, weathering, or corrosion of reinforcement (reinforced concrete only); loss of material due to delamination, exfoliation, spalling, popout, or scaling	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.AP-157	3.3-1, 103	Piping, piping components	Concrete, concrete cylinder piping, reinforced concrete, asbestos cement, cementitious	Soil, concrete	Cracking due to chemical reaction, weathering, or corrosion of reinforcement (reinforced concrete only); loss of material due to delamination, exfoliation, spalling, popout, or scaling	AMP XI.M41, "Buried and Underground Piping and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.AP-66	3.3-1, 009	Piping, piping components	Copper alloy (>15% Zn)	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
M	VII.I.AP-176	3.3-1, 104	Piping, piping components	Fiberglass	Soil	Cracking, blistering, loss of material due to exposure to radiation, temperature or moisture	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.A-462	3.3-1, 177	Piping, piping components	Fiberglass	Soil	Loss of material due to wear	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
M	VII.I.AP-175	3.3-1, 104	Piping, piping components	high density polyethylene (HDPE)	Soil, concrete	Cracking, blistering, loss of material due to exposure to temperature or moisture	AMP XI.M43, "High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VII.I.AP-182	3.3-1, 104	Piping	CFRP	Soil, concrete	Loss of material, cracking, and blistering due general corrosion (steel only), erosion, chemical attack, moisture, or wear	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
M	VII.I.A-406	3.3-1, 133	Piping, piping components	HDPE	Underground	Cracking, blistering, loss of material due to exposure to temperature or moisture	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
N	VII.I.A-420	3.3-1, 133	Piping	CFRP	Underground	Loss of material, cracking, and blistering due to general corrosion (steel only), erosion, chemical attack, moisture, or wear	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.AP-137	3.3-1, 107	Piping, piping components	Stainless steel, nickel alloy	Soil, concrete	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.A-24	3.3-1, 080	Piping, piping components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.AP-198	3.3-1, 109	Piping, piping components	Steel	Soil, concrete	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.AP-284	3.3-1, 109	Piping, piping components	Steel	Underground	Loss of material due to general, pitting, crevice corrosion	AMP XI.M41, "Buried and Underground piping and Tanks"	No
-	VII.I.A-720	3.3-1, 150	Piping, piping components, ducting, ducting components	Fiberglass	Air	Cracking, blistering, loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-428	3.3-1, 149	Piping, piping components, ducting, ducting components	Fiberglass	Air – outdoor	Cracking, blistering, loss of material due to exposure to ultraviolet light, ozone, radiation, temperature, or moisture	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.AP-113	3.3-1, 082	Piping, piping components, ducting, ducting components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.AP-102	3.3-1, 076	Piping, piping components, ducting, ducting components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.A-719	3.3-1, 082	Piping, piping components, ducting, ducting components, seals	Fiberglass	Air	Loss of material due to wear	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-797a	3.3-1, 263	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VII.I.A-706a	3.3-1, 192	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.I.A-706b	3.3-1, 192	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	VII.I.A-706c	3.3-1, 192	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-752a	3.3-1, 223	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.I.A-752b	3.3-1, 223	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	VII.I.A-752c	3.3-1, 223	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.AP-174	3.3-1, 108	Piping, piping components, tanks	Copper Alloy	Soil, underground	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.A-537	3.3-1, 194	Piping, piping components, tanks	polyvinyl chloride	Soil	Loss of material due to wear	AMP XI.M41, "Buried and Underground Piping and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VII.I.A-538	3.3-1, 194	Piping	CFRP	Soil	Loss of material, cracking, and blistering due to general corrosion (steel only), erosion, chemical attack, moisture, or wear	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
-	VII.I.A-714a	3.3-1, 146	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VII.I.A-714b	3.3-1, 146	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	VII.I.A-714c	3.3-1, 146	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.A-775a	3.3-1, 246	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-775b	3.3-1, 246	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	VII.I.A-775c	3.3-1, 246	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.A-425	3.3-1, 144	Piping, piping components, tanks	Stainless steel, steel, aluminum	Soil, concrete	Cracking due to SCC (steel in carbonate/ bicarbonate environment only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.AP-172	3.3-1, 108	Piping, piping components, tanks	Super austenitic	Soil, concrete, underground	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.AP-171	3.3-1, 108	Piping, piping components, tanks	Titanium	Soil, concrete, underground	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VII.I.A-751b	3.3-1, 222	Tanks	Stainless steel, nickel alloy	Air, condensation (internal/external)	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.I.A-751c	3.3-1, 222	Tanks	Stainless steel, nickel alloy	Air, condensation (internal/external)	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VII.I.A-751d	3.3-1, 222	Tanks	Stainless steel, nickel alloy	Air, condensation (internal/external)	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VII.I.A-751e	3.3-1, 222	Tanks	Stainless steel, nickel alloy	Air, condensation (internal/external)	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VII.I.A-755	3.3-1, 226	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
D	VII.I.A-102	-	-	-	-	-	-	-
D	VII.I.A-105	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.I.A-421	-	-	-	-	-	-	-
D	VII.I.A-422	-	-	-	-	-	-	-
D	VII.I.A-424	-	-	-	-	-	-	-
D	VII.I.A-427	-	-	-	-	-	-	-
D	VII.I.A-452	-	-	-	-	-	-	-
D	VII.I.A-455	-	-	-	-	-	-	-
D	VII.I.A-700	-	-	-	-	-	-	-
D	VII.I.A-701	-	-	-	-	-	-	-
D	VII.I.A-702	-	-	-	-	-	-	-
D	VII.I.A-707	-	-	-	-	-	-	-
D	VII.I.A-708	-	-	-	-	-	-	-
D	VII.I.A-723	-	-	-	-	-	-	-
D	VII.I.A-725	-	-	-	-	-	-	-
D	VII.I.A-726	-	-	-	-	-	-	-
D	VII.I.A-750a	-	-	-	-	-	-	-
D	VII.I.A-750b	-	-	-	-	-	-	-
D	VII.I.A-750c	-	-	-	-	-	-	-
D	VII.I.A-750d	-	-	-	-	-	-	-
D	VII.I.A-751a	-	-	-	-	-	-	-
D	VII.I.A-753	-	-	-	-	-	-	-
D	VII.I.A-754a	-	-	-	-	-	-	-
D	VII.I.A-754b	-	-	-	-	-	-	-
D	VII.I.A-754c	-	-	-	-	-	-	-
D	VII.I.A-78	-	-	-	-	-	-	-
D	VII.I.A-81	-	-	-	-	-	-	-
D	VII.I.AP-109	-	-	-	-	-	-	-
D	VII.I.AP-125	-	-	-	-	-	-	-
D	VII.I.AP-126	-	-	-	-	-	-	-
D	VII.I.AP-159	-	-	-	-	-	-	-
D	VII.I.AP-177	-	-	-	-	-	-	-
D	VII.I.AP-242	-	-	-	-	-	-	-
D	VII.I.AP-244	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.I.AP-256	-	-	-	-	-	-	-
D	VII.I.AP-261	-	-	-	-	-	-	-
D	VII.I.AP-262	-	-	-	-	-	-	-
D	VII.I.AP-263	-	-	-	-	-	-	-
D	VII.I.AP-264	-	-	-	-	-	-	-
D	VII.I.AP-265	-	-	-	-	-	-	-
D	VII.I.AP-266	-	-	-	-	-	-	-
D	VII.I.AP-267	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; CFRP = Carbon Fiber Reinforced Polymer ;HDPE = High Density Polyethylene; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

J COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

Systems, Structures, and Components

This section addresses the aging management programs (AMPs) for miscellaneous material/environment combinations that may be found throughout structures and components for auxiliary systems. For the material/environment combinations in this part, aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation. With the exception of components within the scope of American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, or for those where a further evaluation results in identifying aging effects and a corresponding AMP, no AMPs for these structures and components are required.

System Interfaces

The structures and components covered in this section belong to the auxiliary systems in pressurized water reactors and BWRs. (For example, see System Interfaces in VII.A to VII.H2 for details.)

1 **Table J.1 Common Miscellaneous Material/Environment Combinations**

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.J.AP-151	3.3-1, 122	Heat exchanger components	Titanium	Air – indoor uncontrolled, air – outdoor	None	None	No
-	VII.J.A-712	3.3-1, 167	Piping components	Zinc	Air – indoor controlled, air – indoor uncontrolled	None	None	No
-	VII.J.AP-48	3.3-1, 117	Piping elements	Glass	Air	None	None	No
-	VII.J.AP-96	3.3-1, 117	Piping elements	Glass	Air with borated water leakage	None	None	No
-	VII.J.AP-166	3.3-1, 117	Piping elements	Glass	Closed-cycle cooling water	None	None	No
-	VII.J.AP-97	3.3-1, 117	Piping elements	Glass	Condensation	None	None	No
-	VII.J.AP-49	3.3-1, 117	Piping elements	Glass	Fuel oil	None	None	No
-	VII.J.AP-98	3.3-1, 117	Piping elements	Glass	Gas	None	None	No
-	VII.J.AP-15	3.3-1, 117	Piping elements	Glass	Lubricating oil	None	None	No
-	VII.J.AP-50	3.3-1, 117	Piping elements	Glass	Raw water	None	None	No
-	VII.J.AP-52	3.3-1, 117	Piping elements	Glass	Treated borated water	None	None	No
-	VII.J.AP-51	3.3-1, 117	Piping elements	Glass	Treated water	None	None	No
-	VII.J.AP-14	3.3-1, 117	Piping elements	Glass	Underground	None	None	No
-	VII.J.AP-277	3.3-1, 119	Piping elements	Glass	Waste Water	None	None	No
-	VII.J.AP-37	3.3-1, 113	Piping, piping components	Aluminum	Gas	None	None	No
M	VII.J.AP-144	3.3-1, 114	Heat exchanger components and tanks, Piping, piping components	Copper alloy	Air, condensation	None	None	No
-	VII.J.A-711	3.3-1, 166	Piping, piping components	Copper alloy	Concrete	None	None	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.J.AP-9	3.3-1, 114	Piping, piping components	Copper alloy	Gas	None	None	No
-	VII.J.AP-11	3.3-1, 115	Piping, piping components	Copper alloy, copper alloy (>8% Al)	Air with borated water leakage	None	None	No
-	VII.J.A-710	3.3-1, 178	Piping, piping components	Fiberglass	Concrete	None	None	No
-	VII.J.AP-13	3.3-1, 116	Piping, piping components	Galvanized steel	Air – indoor uncontrolled	None	None	No
-	VII.J.AP-260	3.3-1, 119	Piping, piping components	Nickel alloy	Air with borated water leakage	None	None	No
-	VII.J.AP-268	3.3-1, 119	Piping, piping components	Polyvinyl chloride (PVC)	Air – indoor uncontrolled	None	None	No
-	VII.J.AP-269	3.3-1, 119	Piping, piping components	PVC	Condensation, raw water (potable)	None	None	No
-	VII.J.AP-18	3.3-1, 120	Piping, piping components	Stainless steel	Air with borated water leakage	None	None	No
-	VII.J.AP-19	3.3-1, 202	Piping, piping components	Stainless steel	Concrete	None	None	Yes
-	VII.J.AP-22	3.3-1, 120	Piping, piping components	Stainless steel	Gas	None	None	No
-	VII.J.AP-2	3.3-1, 121	Piping, piping components	Steel	Air – indoor controlled	None	None	No
-	VII.J.AP-282	3.3-1, 112	Piping, piping components	Steel	Concrete	None	None	Yes
-	VII.J.AP-6	3.3-1, 121	Piping, piping components	Steel	Gas	None	None	No
-	VII.J.AP-160	3.3-1, 122	Piping, piping components	Titanium	Air – indoor uncontrolled, air – outdoor	None	None	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VII.J.A-703	3.3-1, 181	Piping, piping components	Titanium	Condensation	None	None	No
-	VII.J.A-768	3.3-1, 239	Piping, piping components, heat exchanger components other than tubes	Titanium (ASTM Grades 1, 2, 7, 9, 11, or 12)	Closed-cycle cooling water	None	None	No
-	VII.J.A-766	3.3-1, 237	Piping, piping components, heat exchanger components other than tubes	Titanium (ASTM Grades 1, 2, 7, 9, 11, or 12)	Treated water	None	None	No
-	VII.J.A-777	3.3-1, 248	Piping, piping components, tanks	Aluminum	Air with borated water leakage	None	None	No
-	VII.J.A-709	3.3-1, 184	Piping, piping components, tanks	PVC	Concrete	None	None	No
D	VII.J.A-735	-	-	-	-	-	-	-
D	VII.J.A-763a	-	-	-	-	-	-	-
D	VII.J.A-763b	-	-	-	-	-	-	-
D	VII.J.A-763c	-	-	-	-	-	-	-
D	VII.J.A-763d	-	-	-	-	-	-	-
D	VII.J.AP-123	-	-	-	-	-	-	-
D	VII.J.AP-134	-	-	-	-	-	-	-
D	VII.J.AP-135	-	-	-	-	-	-	-
D	VII.J.AP-152a	-	-	-	-	-	-	-
D	VII.J.AP-152b	-	-	-	-	-	-	-
D	VII.J.AP-16	-	-	-	-	-	-	-
D	VII.J.AP-161a	-	-	-	-	-	-	-
D	VII.J.AP-161b	-	-	-	-	-	-	-
D	VII.J.AP-167	-	-	-	-	-	-	-
D	VII.J.AP-17	-	-	-	-	-	-	-
D	VII.J.AP-20	-	-	-	-	-	-	-
D	VII.J.AP-36	-	-	-	-	-	-	-

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VII.J.AP-4	-	-	-	-	-	-	-
D	VII.J.AP-8	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; PVC = polyvinyl chloride; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

CHAPTER VIII

STEAM AND POWER CONVERSION SYSTEM

VIII STEAM AND POWER CONVERSION SYSTEM

A. STEAM TURBINE SYSTEM

B1. MAIN STEAM SYSTEM (PRESSURIZED WATER REACTOR)

B2. MAIN STEAM SYSTEM (BOILING WATER REACTOR)

C. EXTRACTION STEAM SYSTEM

D1. FEEDWATER SYSTEM (PRESSURIZED WATER REACTOR)

D2. FEEDWATER SYSTEM (BOILING WATER REACTOR)

E. CONDENSATE SYSTEM

F. STEAM GENERATOR BLOWDOWN SYSTEM (PRESSURIZED WATER REACTOR)

G. AUXILIARY FEEDWATER SYSTEM (PRESSURIZED WATER REACTOR)

H. EXTERNAL SURFACES OF COMPONENTS AND MISCELLANEOUS BOLTING

I. COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

A STEAM TURBINE SYSTEM

Systems, Structures, and Components

This section addresses the piping and fittings in the steam turbine system for both pressurized water reactors (PWRs) and boiling water reactors (BWRs) and consists of the lines from the high-pressure turbine to the moisture separator/reheater (MSR) and the lines from the MSR to the low-pressure turbine. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the steam turbine system are governed by Group D Quality Standards.

The steam turbine performs its intended functions with moving parts. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.2(a) (1), it is not subject to an aging management review.

The aging management programs for the degradation of external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the steam turbine system include the PWR and BWR main steam system (VIII.B1 and VIII.B2), the extraction steam system (VIII.C), and the condensate system (VIII.E).

Table A.1 Steam Turbine System

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.A.S-432	3.4-1, 081	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VIII.A.S-23	3.4-1, 025	Heat exchanger components	Steel	Closed-cycle cooling water	microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.A.SP-64	3.4-1, 028	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.A.S-464	3.4-1, 116	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to stress corrosion cracking (SCC), reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.A.SP-92	3.4-1, 043	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.A.SP-31	3.4-1, 020	Piping, piping components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.A.SP-101	3.4-1, 016	Piping, piping components	Copper alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.A.SP-30	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.A.SP-28	3.4-1, 033	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.A.SP-27	3.4-1, 033	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.A.S-408	3.4-1, 060	Piping, piping components	Metallic	Steam	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.A.SP-95	3.4-1, 044	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.A.SP-98	3.4-1, 011	Piping, piping components	Stainless steel	Steam	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.A.SP-155	3.4-1, 084	Piping, piping components	Stainless steel	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.A.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.A.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.A.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.A.SP-91	3.4-1, 040	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.A.SP-71	3.4-1, 014	Piping, piping components	Steel	Steam	Loss of material due to general, pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.A.S-15	3.4-1, 005	Piping, piping components	Steel	Steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.A.S-436	3.4-1, 089	Piping, piping components (for components not covered by U.S. Nuclear Regulatory Commission Generic Letters 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.A.S-478a	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.A.S-478b	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.A.S-400a	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M20, "Open-Cycle Cooling Water System"	Yes
-	VIII.A.S-400b	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.A.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.A.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.A.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.A.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.A.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VIII.A.S-401	-	-	-	-	-	-	-
D	VIII.A.S-402	-	-	-	-	-	-	-
D	VIII.A.S-414	-	-	-	-	-	-	-
D	VIII.A.S-415	-	-	-	-	-	-	-
D	VIII.A.S-441	-	-	-	-	-	-	-
D	VIII.A.SP-127e	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

B MAIN STEAM SYSTEMS

B1 MAIN STEAM SYSTEM (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the main steam (MS) system for PWRs. It includes the MS lines from the SG to the steam turbine and the turbine bypass lines from the MS lines to the condenser. Also included are the lines to the main feedwater (FW) and auxiliary feedwater (AFW) pump turbines, steam drains, and valves, including the containment isolation valves on the MS lines and the lines to the AFW pump turbines.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the portion of the MS system extending from the SG up to the second containment isolation valve is governed by Group B or C Quality Standards, and all other components that compose the MS system located downstream of these isolation valves are governed by Group D Quality Standards.

The internals of the valves perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems and structures that interface with the MS system include PWR concrete or steel containment structures (II.A1 and II.A2), common components (II.A3), the SG (IV.D1 and IV.D2), the steam turbine system (VIII.A), the FW system (VIII.D1), the condensate system (VIII.E), and the AFW system (VIII.G).

Table B.1 Main Steam System (PWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B1.S-408	3.4-1, 060	Piping, piping components	Metallic	Steam	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.B1.SP-157	3.4-1, 084	Piping, piping components	Nickel alloy	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B1.SP-98	3.4-1, 011	Piping, piping components	Stainless steel	Steam	Cracking due to stress corrosion cracking (SCC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B1.SP-155	3.4-1, 084	Piping, piping components	Stainless steel	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B1.SP-88	3.4-1, 011	Piping, piping components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B1.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B1.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.B1.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.B1.SP-87	3.4-1, 085	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B1.SP-59	3.4-1, 036	Piping, piping components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.B1.S-08	3.4-1, 001	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B1.SP-71	3.4-1, 014	Piping, piping components	Steel	Steam	Loss of material due to general, pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B1.S-15	3.4-1, 005	Piping, piping components	Steel	Steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.B1.SP-74	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B1.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.B1.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.B1.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B1.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.B1.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VIII.B1.S-400	-	-	-	-	-	-	-
D	VIII.B1.S-401	-	-	-	-	-	-	-
D	VIII.B1.S-402	-	-	-	-	-	-	-
D	VIII.B1.S-414	-	-	-	-	-	-	-
D	VIII.B1.S-415	-	-	-	-	-	-	-
D	VIII.B1.S-432	-	-	-	-	-	-	-
D	VIII.B1.S-441	-	-	-	-	-	-	-
D	VIII.B1.SP-110	-	-	-	-	-	-	-
D	VIII.B1.SP-127e	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; SRP-SLR = Standard Review Plan-Subsequent License Renewal; TLAA = Time-Limited Aging Analysis.

B2 MAIN STEAM SYSTEM (BOILING WATER REACTOR)

Systems, Structures, and Components

This section addresses the main steam (MS) system for BWRs. It includes the MS lines from the outermost containment isolation valve to the steam turbines and the turbine bypass lines from the MS lines to the condenser. Also included are steam drains, lines to the main FW, high-pressure coolant injection , and reactor core isolation cooling turbines.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” portions of the MS system extending from the outermost containment isolation valve up to and including the turbine stop and bypass valves, as well as connected piping up to and including the first valve that is either normally closed or capable of automatic closure during all modes of normal reactor operation, are governed by Group B Quality Standards. The remaining portions of the MS system consist of components governed by Group D Quality Standards. For BWRs containing a shutoff valve in addition to the two containment isolation valves in the MS line, Group B Quality Standards apply only to those portions of the system extending from the outermost containment isolation valves up to and including the shutoff valve. The portion of the MS system extending from the reactor pressure vessel up to the second isolation valve and including the containment isolation valves is governed by Group A Quality Standards, and is covered in IV.C1.

The internals of the valves perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the MS system include the BWR Mark 1, Mark 2, or Mark 3 containment structures (II.B1, II.B2, and II.B3, respectively) and common components (II.B4), the reactor coolant pressure boundary (IV.C1), the steam turbine system (VIII.A), the FW system (VIII.D2), and the condensate system (VIII.E).

Table B.2 Main Steam System (BWR)

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B2.S-408	3.4-1, 060	Piping, piping components	Metallic	Steam	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.B2.SP-98	3.4-1, 011	Piping, piping components	Stainless steel	Steam	Cracking due to stress corrosion cracking (SCC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B2.SP-155	3.4-1, 084	Piping, piping components	Stainless steel	Steam	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B2.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.B2.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B2.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.B2.S-08	3.4-1, 001	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VIII.B2.SP-160	3.4-1, 014	Piping, piping components	Steel	Steam	Loss of material due to general, pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B2.S-15	3.4-1, 005	Piping, piping components	Steel	Steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.B2.SP-73	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, microbiologically influenced corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.B2.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B2.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.B2.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.B2.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.B2.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VIII.B2.S-400	-	-	-	-	-	-	-
D	VIII.B2.S-401	-	-	-	-	-	-	-
D	VIII.B2.S-402	-	-	-	-	-	-	-
D	VIII.B2.S-414	-	-	-	-	-	-	-
D	VIII.B2.S-415	-	-	-	-	-	-	-
D	VIII.B2.S-432	-	-	-	-	-	-	-
D	VIII.B2.S-441	-	-	-	-	-	-	-
D	VIII.B2.SP-110	-	-	-	-	-	-	-
D	VIII.B2.SP-127e	-	-	-	-	-	-	-

AMP = aging management program; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

C EXTRACTION STEAM SYSTEM

Systems, Structures, and Components

This section addresses the extraction steam lines for both PWRs and BWRs, which extend from the steam turbine to the FW heaters, including the drain lines. Based on Regulatory Guide 1.26, "Quality Group Classifications, and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components that compose the extraction steam system are governed by Group D Quality Standards.

The internals of the valves perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the extraction steam system include the steam turbine system (VIII.A), the PWR and BWR main steam system (VIII.B1 and VIII.B2), the PWR and BWR FW system (VIII.D1 and VIII.D2), and the condensate system (VIII.E).

Table C.1 Extraction Steam System

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.C.S-408	3.4-1, 060	Piping, piping components	Metallic	Steam	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.C.SP-88	3.4-1, 011	Piping, piping components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking (SCC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.C.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.C.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.C.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.C.SP-87	3.4-1, 085	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.C.SP-71	3.4-1, 014	Piping, piping components	Steel	Steam	Loss of material due to general, pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.C.S-15	3.4-1, 005	Piping, piping components	Steel	Steam	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.C.SP-73	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.C.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.C.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.C.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.C.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.C.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VIII.C.S-400	-	-	-	-	-	-	-
D	VIII.C.S-401	-	-	-	-	-	-	-
D	VIII.C.S-402	-	-	-	-	-	-	-
D	VIII.C.S-414	-	-	-	-	-	-	-
D	VIII.C.S-415	-	-	-	-	-	-	-
D	VIII.C.S-432	-	-	-	-	-	-	-
D	VIII.C.S-441	-	-	-	-	-	-	-
D	VIII.C.SP-127e	-	-	-	-	-	-	-

AMP = aging management program; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

D FEEDWATER SYSTEM

D1 FEEDWATER SYSTEM (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the main FW system for PWRs, which extends from the condensate system to the steam generator (SG). It consists of the main FW lines, FW pumps, and valves, including the containment isolation valves. Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the portion of the FW system extending from the secondary side of the SG up to the second containment isolation valve is governed by Group B or C Quality Standards. All other components in the FW system located downstream from these isolation valves are governed by Group D Quality Standards.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems and structures that interface with the FW system include PWR concrete or steel containment structures (II.A1 and II.A2) and common components (II.A3), the SGs (IV.D1 and IV.D2), the main steam system (VIII.B1), the extraction steam system (VIII.C), the condensate system (VIII.E), and the auxiliary feedwater system (VIII.G).

1 **Table D.1 Feedwater Systems (PWR)**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D1.S-432	3.4-1, 081	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
M	VIII.D1.S-482	3.4-1, 134	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to stress corrosion cracking (SCC), flow blockage due to fouling.	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D1.S-457d	3.4-1, 109	Piping, piping components	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D1.S-481	3.4-1, 133	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D1.SP-90	3.4-1, 016	Piping, piping components	Aluminum	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D1.SP-92	3.4-1, 043	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
--	VIII.D1.S-439	3.4-1, 092	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
	VIII.D1.S-408	3.4-1, 060	Piping, piping components	Metallic	Treated water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.D1.SP-95	3.4-1, 044	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D1.SP-88	3.4-1, 011	Piping, piping components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D1.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.D1.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.D1.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D1.SP-87	3.4-1, 085	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D1.S-11	3.4-1, 001	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VIII.D1.SP-91	3.4-1, 040	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D1.SP-74	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D1.S-16	3.4-1, 005	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.D1.S-483b	3.4-1, 135	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D1.S-478a	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D1.S-478b	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D1.S-472	3.4-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D1.S-429	3.4-1, 078	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D1.S-457b	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D1.S-457e	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.D1.S-400b	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D1.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.D1.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D1.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D1.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.D1.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VIII.D1.S-401	-	-	-	-	-	-	-
D	VIII.D1.S-402	-	-	-	-	-	-	-
D	VIII.D1.S-414	-	-	-	-	-	-	-
D	VIII.D1.S-415	-	-	-	-	-	-	-
D	VIII.D1.S-441	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VIII.D1.S-457a	-	-	-	-	-	-	-
D	VIII.D1.S-458a	-	-	-	-	-	-	-
D	VIII.D1.S-458b	-	-	-	-	-	-	-
D	VIII.D1.S-458c	-	-	-	-	-	-	-
D	VIII.D1.S-458d	-	-	-	-	-	-	-
D	VIII.D1.S-459a	-	-	-	-	-	-	-
D	VIII.D1.S-459b	-	-	-	-	-	-	-
D	VIII.D1.S-459c	-	-	-	-	-	-	-
D	VIII.D1.SP-127e	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

D2 FEEDWATER SYSTEM (BOILING WATER REACTOR)

Systems, Structures, and Components

This section addresses the main FW system for BWRs, which extends from the condensate and condensate booster system to the outermost FW isolation valve on the FW lines to the reactor vessel. It consists of the main FW lines, FW pumps, and valves.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the portions of the FW system extending from the outermost containment isolation valves up to and including the shutoff valve, or the first valve that is either normally closed or capable of closure during all modes of normal reactor operation, are governed by Group B Quality Standards. The remaining portions of the FW system consist of components governed by Group D Quality Standards. The portion of the FW system extending from the reactor vessel up to the second containment isolation valve, including the isolation valves, is governed by Group A Quality Standards and is covered in IV.C1.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the FW system include the BWR Mark 1, Mark 2, or Mark 3 containment structures (II.B1, II.B2, and II.B3, respectively) and common components (II.B4), the reactor coolant pressure boundary (IV.C1), the main steam system (VIII.B2), the extraction steam system (VIII.C), and the condensate system (VIII.E).

1 **Table D.2 Feedwater Systems (BWR)**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D2.S-432	3.4-1, 081	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
M	VIII.D2.S-482	3.4-1, 134	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to stress corrosion cracking (SCC), flow blockage due to fouling.	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D2.S-457d	3.4-1, 109	Piping, piping components	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D2.S-481	3.4-1, 133	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D2.SP-90	3.4-1, 016	Piping, piping components	Aluminum	Treated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D2.SP-92	3.4-1, 043	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D2.S-439	3.4-1, 092	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.D2.S-408	3.4-1, 060	Piping, piping components	Metallic	Treated water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.D2.SP-95	3.4-1, 044	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D2.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D2.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.D2.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D2.SP-87	3.4-1, 085	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D2.S-11	3.4-1, 001	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes
-	VIII.D2.SP-91	3.4-1, 040	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D2.SP-73	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.D2.S-16	3.4-1, 005	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.D2.S-483b	3.4-1, 135	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D2.S-478a	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D2.S-478b	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D2.S-472	3.4-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D2.S-429	3.4-1, 078	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.D2.S-457b	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D2.S-457e	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.D2.S-400b	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D2.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.D2.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.D2.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.D2.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.D2.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
D	VIII.D2.S-401	-	-	-	-	-	-	-
D	VIII.D2.S-402	-	-	-	-	-	-	-
D	VIII.D2.S-414	-	-	-	-	-	-	-
D	VIII.D2.S-415	-	-	-	-	-	-	-
D	VIII.D2.S-441	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VIII.D2.S-457a	-	-	-	-	-	-	-
D	VIII.D2.S-458a	-	-	-	-	-	-	-
D	VIII.D2.S-458b	-	-	-	-	-	-	-
D	VIII.D2.S-458c	-	-	-	-	-	-	-
D	VIII.D2.S-458d	-	-	-	-	-	-	-
D	VIII.D2.S-459a	-	-	-	-	-	-	-
D	VIII.D2.S-459b	-	-	-	-	-	-	-
D	VIII.D2.S-459c	-	-	-	-	-	-	-
D	VIII.D2.SP-127e	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

E CONDENSATE SYSTEM

Systems, Structures, and Components

This section addresses the condensate system for both PWRs and BWRs, which extends from the condenser hotwells to the suction of FW pumps, including condensate and condensate booster pumps, condensate coolers, condensate cleanup system, and condensate storage tanks. Based on Regulatory Guide 1.26, “Quality Group Classifications, and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” all components that compose the condensate system are governed by Group D Quality Standards.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the condensate system include the steam turbine system (VIII.A), the PWR and BWR main steam system (VIII.B1 and VIII.B2), the PWR and BWR FW system (VIII.D1 and VIII.D2), the auxiliary feedwater system (VIII.G, PWR only), the BWR reactor water cleanup system (VII.E3), the open- or closed-cycle cooling water systems (VII.C1 or VII.C2), and the condensate storage facility.

Table E.1 Condensate System

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-432	3.4-1, 081	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
--	VIII.E.S-25	3.4-1, 026	Heat exchanger components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
	VIII.E.SP-117	3.4-1, 019	Heat exchanger components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.E.S-23	3.4-1, 025	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.E.SP-146	3.4-1, 019	Heat exchanger components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.E.SP-77	3.4-1, 015	Heat exchanger components	Steel	Treated water	Loss of material due to general, pitting, crevice, corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-438	3.4-1, 091	Heat exchanger components (for components not covered by U.S. Nuclear Regulatory Commission [NRC] General Letters (GL) 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.SP-80	3.4-1, 085	Heat exchanger components and tubes	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.SP-113	3.4-1, 045	Heat exchanger tubes	Aluminum	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.SP-57	3.4-1, 028	Heat exchanger tubes	Copper alloy	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.E.SP-56	3.4-1, 022	Heat exchanger tubes	Copper alloy	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.E.SP-100	3.4-1, 018	Heat exchanger tubes	Copper alloy	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-41	3.4-1, 028	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.E.S-28	3.4-1, 022	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.E.SP-96	3.4-1, 018	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.SP-64	3.4-1, 028	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.E.S-464	3.4-1, 116	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to stress corrosion cracking (SCC), reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	-	-	-	-	-	-	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
M	VIII.E.S-482	3.4-1, 134	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC, flow blockage due to fouling.	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.S-437	3.4-1, 090	Heat exchanger tubes (for components not covered by NRC GL 89-13)	Steel, stainless steel, copper alloy	Raw water	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.S-433	3.4-1, 086	Heat exchanger tubes internal to components	Stainless steel, steel, aluminum, copper alloy, titanium	Air, condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.SP-147a	3.4-1, 035	Piping, piping components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.SP-147b	3.4-1, 035	Piping, piping components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-147c	3.4-1, 035	Piping, piping components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.E.S-457d	3.4-1, 109	Piping, piping components	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.E.S-481	3.4-1, 133	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.S-469b	3.4-1, 120	Piping, piping components	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-469c	3.4-1, 120	Piping, piping components	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.E.SP-90	3.4-1, 016	Piping, piping components	Aluminum	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
	VIII.E.SP-8	3.4-1, 027	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.E.SP-92	3.4-1, 043	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.SP-31	3.4-1, 020	Piping, piping components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.E.SP-29	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-30	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.E.S-439	3.4-1, 092	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.E.SP-55	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.E.SP-26	3.4-1, 032	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.E.SP-27	3.4-1, 033	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.E.SP-39	3.4-1, 026	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.E.SP-54	3.4-1, 023	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.E.SP-95	3.4-1, 044	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-36	3.4-1, 020	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.E.SP-88	3.4-1, 011	Piping, piping components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.E.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-87	3.4-1, 085	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.SP-59	3.4-1, 036	Piping, piping components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.SP-60	3.4-1, 037	Piping, piping components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.SP-91	3.4-1, 040	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-73	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.S-16	3.4-1, 005	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.E.S-436	3.4-1, 089	Piping, piping components (for components not covered by NRC GL 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	VIII.E.S-415	3.4-1, 068	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-483b	3.4-1, 135	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.S-478a	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.E.S-478b	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-401	3.4-1, 066	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water, raw water, treated water, lubricating oil	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VIII.E.S-414	3.4-1, 067	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water, raw water, treated water, lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VIII.E.S-472	3.4-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-429	3.4-1, 078	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.E.SP-147d	3.4-1, 035	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.E.S-457b	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.S-457e	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-469a	3.4-1, 120	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.S-469d	3.4-1, 120	Piping, piping components, tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.E.S-400a	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M20, "Open-Cycle Cooling Water System"	Yes
-	VIII.E.S-400b	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.E.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.E.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.E.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.E.S-469e	3.4-1, 120	Tanks	Aluminum	Raw water, waste water	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.E.SP-97	3.4-1, 011	Tanks	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.SP-162	3.4-1, 083	Tanks	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-75	3.4-1, 012	Tanks	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.E.S-445a	3.4-1, 097	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.E.S-445b	3.4-1, 097	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.S-445c	3.4-1, 097	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-450a	3.4-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.E.S-450b	3.4-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.S-450c	3.4-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.E.S-444	3.4-1, 096	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-448a	3.4-1, 100	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.E.S-448b	3.4-1, 100	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.S-448c	3.4-1, 100	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.E.S-449	3.4-1, 101	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.S-447	3.4-1, 099	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VIII.E.S-446a	3.4-1, 098	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.E.S-446b	3.4-1, 098	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.E.S-446c	3.4-1, 098	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.E.SP-115	3.4-1, 030	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel	Soil, concrete, air, condensation	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VIII.E.S-405	3.4-1, 062	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel, stainless steel, aluminum	Treated water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
D	VIII.E.S-31	-	-	-	-	-	-	-
D	VIII.E.S-402	-	-	-	-	-	-	-
D	VIII.E.S-421	-	-	-	-	-	-	-
D	VIII.E.S-440	-	-	-	-	-	-	-
D	VIII.E.S-441	-	-	-	-	-	-	-
D	VIII.E.S-457a	-	-	-	-	-	-	-
D	VIII.E.S-458a	-	-	-	-	-	-	-
D	VIII.E.S-458b	-	-	-	-	-	-	-
D	VIII.E.S-458c	-	-	-	-	-	-	-
D	VIII.E.S-458d	-	-	-	-	-	-	-
D	VIII.E.S-459a	-	-	-	-	-	-	-
D	VIII.E.S-459b	-	-	-	-	-	-	-
D	VIII.E.S-459c	-	-	-	-	-	-	-
D	VIII.E.S-467	-	-	-	-	-	-	-
D	VIII.E.SP-127e	-	-	-	-	-	-	-
D	VIII.E.SP-137	-	-	-	-	-	-	-
D	VIII.E.SP-138	-	-	-	-	-	-	-
D	VIII.E.SP-139	-	-	-	-	-	-	-
D	VIII.E.SP-140	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VIII.E.SP-145	-	-	-	-	-	-	-
D	VIII.E.SP-147e	-	-	-	-	-	-	-
D	VIII.E.SP-78	-	-	-	-	-	-	-
D	VIII.E.SP-81	-	-	-	-	-	-	-
D	VIII.E.SP-94	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; GL = Generic Letters; MIC = microbiologically influenced corrosion; NRC = U.S. Nuclear Regulatory Commission; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

F STEAM GENERATOR BLOWDOWN SYSTEM (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the SG blowdown system for PWRs, which extends from the SG through the blowdown condenser and includes the containment isolation valves and small bore piping less than nominal pipe size 2 in. (including instrumentation lines).

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” the portion of the blowdown system extending from the SG up to the isolation valve outside the containment and including the isolation valves is governed by Group B or C Quality Standards. The remaining portions of the SG blowdown system consist of components governed by Group D Quality Standards.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the blowdown system include the SG (IV.D1 and IV.D2) and the open- or closed-cycle cooling water systems (VII.C1 or VII.C2).

1 **Table F.1 Steam Generator Blowdown System (PWR)**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.S-432	3.4-1, 081	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.S-25	3.4-1, 026	Heat exchanger components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.F.SP-117	3.4-1, 019	Heat exchanger components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.F.SP-85	3.4-1, 011	Heat exchanger components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to stress corrosion cracking (SCC)	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.S-23	3.4-1, 025	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.F.SP-146	3.4-1, 019	Heat exchanger components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.S-438	3.4-1, 091	Heat exchanger components (for components not covered by U.S. Nuclear Regulatory Commission [NRC] General Letters [GL] 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.F.SP-100	3.4-1, 018	Heat exchanger tubes	Copper alloy	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.SP-41	3.4-1, 028	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.F.S-28	3.4-1, 022	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.F.SP-96	3.4-1, 018	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.SP-64	3.4-1, 028	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.F.S-464	3.4-1, 116	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.S-462	3.4-1, 114	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
M	VIII.F.S-482	3.4-1, 134	Heat exchanger tubes	Titanium (ASTM Grades 3, 4, or 5)	Raw water	Cracking due to SCC, flow blockage due to fouling.	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.F.S-437	3.4-1, 090	Heat exchanger tubes (for components not covered by NRC GL 89-13)	Steel, stainless steel, copper alloy	Raw water	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.F.S-457d	3.4-1, 109	Piping, piping components	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.S-481	3.4-1, 133	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.F.SP-90	3.4-1, 016	Piping, piping components	Aluminum	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.SP-8	3.4-1, 027	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.F.SP-31	3.4-1, 020	Piping, piping components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.F.SP-101	3.4-1, 016	Piping, piping components	Copper alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.SP-29	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.SP-30	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.F.S-439	3.4-1, 092	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.F.SP-55	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.F.SP-27	3.4-1, 033	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.F.SP-39	3.4-1, 026	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.F.SP-54	3.4-1, 023	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.F.SP-36	3.4-1, 020	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.F.SP-88	3.4-1, 011	Piping, piping components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.F.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.F.SP-87	3.4-1, 085	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.SP-74	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.F.S-16	3.4-1, 005	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.S-436	3.4-1, 089	Piping, piping components (for components not covered by NRC GL 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	VIII.F.S-415	3.4-1, 068	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VIII.F.S-483b	3.4-1, 135	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.S-478a	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.F.S-478b	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.F.S-401	3.4-1, 066	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water, raw water, treated water, lubricating oil	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VIII.F.S-414	3.4-1, 067	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water, raw water, treated water, lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.S-457b	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.F.S-457e	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.F.S-400a	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M20, "Open-Cycle Cooling Water System"	Yes
-	VIII.F.S-400b	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.F.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.F.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.F.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.F.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.F.SP-80	3.4-1, 085	PWR heat exchanger components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
D	VIII.F.S-402	-	-	-	-	-	-	-
D	VIII.F.S-440	-	-	-	-	-	-	-
D	VIII.F.S-441	-	-	-	-	-	-	-
D	VIII.F.S-457a	-	-	-	-	-	-	-
D	VIII.F.S-458a	-	-	-	-	-	-	-
D	VIII.F.S-458b	-	-	-	-	-	-	-
D	VIII.F.S-458c	-	-	-	-	-	-	-
D	VIII.F.S-458d	-	-	-	-	-	-	-
D	VIII.F.S-459a	-	-	-	-	-	-	-
D	VIII.F.S-459b	-	-	-	-	-	-	-
D	VIII.F.S-459c	-	-	-	-	-	-	-
D	VIII.F.SP-127e	-	-	-	-	-	-	-
D	VIII.F.SP-56	-	-	-	-	-	-	-
D	VIII.F.SP-78	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; GL = Generic Letters; MIC = microbiologically influenced corrosion; NRC = U.S. Nuclear Regulatory Commission; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

G AUXILIARY FEEDWATER SYSTEM (PRESSURIZED WATER REACTOR)

Systems, Structures, and Components

This section addresses the AFW system for PWRs, which extends from the AFW piping that takes suction from the condensate storage tank or backup water supply system to the SG or to the main FW line. They consist of AFW piping, AFW pumps, pump turbine oil coolers, and valves, including the containment isolation valves.

Based on Regulatory Guide 1.26, “Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants,” portions of the AFW system extending from the secondary side of the SG up to the second isolation valve and including the containment isolation valves are governed by Group B Quality Standards. In addition, portions of the AFW system that are required for their safety functions and that either do not operate during any mode of normal reactor operation or cannot be tested adequately are also governed by Group B Quality Standards. The remainder of the structures and components covered in this section are governed by Group C Quality Standards.

Pump and valve internals perform their intended functions with moving parts or with a change in configuration. They are subject to replacement based on qualified life or a specified time period. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 54.21(a)(1), they are not subject to an aging management review.

The aging management programs for the degradation of the external surfaces of components and miscellaneous bolting are included in VIII.H. Common miscellaneous material/environment combinations, for which aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation, are included in VIII.I.

The system piping includes all pipe sizes, including instrument piping.

System Interfaces

The systems that interface with the AFW system include the SG (IV.D1 and IV.D2), the main steam system (VIII.B1), the PWR feedwater system (VIII.D1), the condensate system (VIII.E), the open- or closed-cycle cooling water systems (VII.C1 or VII.C2) and the condensate storage facility.

1 **Table G.1 Auxiliary Feedwater System (PWR)**

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-432	3.4-1, 081	Any	Steel	Treated water, raw water	Long-term loss of material due to general corrosion	AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.S-25	3.4-1, 026	Heat exchanger components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, microbiologically influenced corrosion (MIC)	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.G.SP-79	3.4-1, 044	Heat exchanger components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-117	3.4-1, 019	Heat exchanger components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.S-23	3.4-1, 025	Heat exchanger components	Steel	Closed-cycle cooling water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.G.SP-76	3.4-1, 041	Heat exchanger components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-146	3.4-1, 019	Heat exchanger components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.S-438	3.4-1, 091	Heat exchanger components (for components not covered by Nuclear Regulatory Commission [NRC] Generic Letters (GL) 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.SP-113	3.4-1, 045	Heat exchanger tubes	Aluminum	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-99	3.4-1, 046	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-56	3.4-1, 022	Heat exchanger tubes	Copper alloy	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-100	3.4-1, 018	Heat exchanger tubes	Copper alloy	Treated water	Reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-41	3.4-1, 028	Heat exchanger tubes	Stainless steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.G.SP-102	3.4-1, 046	Heat exchanger tubes	Stainless steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.S-28	3.4-1, 022	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.SP-64	3.4-1, 028	Heat exchanger tubes	Steel	Closed-cycle cooling water	Reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.G.SP-103	3.4-1, 046	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer due to fouling	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-27	3.4-1, 022	Heat exchanger tubes	Steel	Raw water	Reduction of heat transfer due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.S-464	3.4-1, 116	Heat exchanger tubes	Titanium	Closed-cycle cooling water	Cracking due to stress corrosion cracking (SCC), reduction of heat transfer due to fouling	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.G.S-462	3.4-1, 114	Heat exchanger tubes	Titanium	Treated water	Cracking due to SCC, reduction of heat transfer due to fouling	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.S-437	3.4-1, 090	Heat exchanger tubes (for components not covered by NRC GL 89-13)	Steel, stainless steel, copper alloy	Raw water	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.S-433	3.4-1, 086	Heat exchanger tubes internal to components	Stainless steel, steel, aluminum, copper alloy, titanium	Air, condensation	Reduction of heat transfer due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-147a	3.4-1, 035	Piping, piping components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.G.SP-147b	3.4-1, 035	Piping, piping components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.G.SP-147c	3.4-1, 035	Piping, piping components	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.G.S-457d	3.4-1, 109	Piping, piping components	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.G.SP-114	3.4-1, 042	Piping, piping components	Aluminum	Lubricating oil	Loss of material due to pitting, crevice corrosion	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-481	3.4-1, 133	Piping, piping components	Aluminum	Raw water	Flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.SP-90	3.4-1, 016	Piping, piping components	Aluminum	Treated water, treated borated water	Loss of material due to pitting, crevice corrosion	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-8	3.4-1, 027	Piping, piping components	Copper alloy	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.G.SP-92	3.4-1, 043	Piping, piping components	Copper alloy	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-31	3.4-1, 020	Piping, piping components	Copper alloy	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.SP-29	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Closed-cycle cooling water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-30	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.G.S-439	3.4-1, 092	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.G.SP-55	3.4-1, 033	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.G.SP-28	3.4-1, 033	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Raw water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.G.SP-26	3.4-1, 032	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Soil	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
M	VIII.G.SP-27	3.4-1, 033	Piping, piping components	Gray cast iron, ductile iron, malleable iron	Treated water	Loss of material due to selective leaching	AMP XI.M33, "Selective Leaching"	No
-	VIII.G.S-408	3.4-1, 060	Piping, piping components	Metallic	Treated water	Wall thinning due to erosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No
-	VIII.G.SP-39	3.4-1, 026	Piping, piping components	Stainless steel	Closed-cycle cooling water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M21A, "Closed Treated Water Systems"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-54	3.4-1, 023	Piping, piping components	Stainless steel	Closed-cycle cooling water >60°C (>140°F)	Cracking due to SCC	AMP XI.M21A, "Closed Treated Water Systems"	No
-	VIII.G.SP-95	3.4-1, 044	Piping, piping components	Stainless steel	Lubricating oil	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-36	3.4-1, 020	Piping, piping components	Stainless steel	Raw water	Loss of material due to pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.SP-88	3.4-1, 011	Piping, piping components	Stainless steel	Treated water >60°C (>140°F)	Cracking due to SCC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-127a	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.G.SP-127b	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-127c	3.4-1, 003	Piping, piping components	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.G.SP-87	3.4-1, 085	Piping, piping components	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-59	3.4-1, 036	Piping, piping components	Steel	Air – outdoor	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.S-11	3.4-1, 001	Piping, piping components	Steel	Any	Cumulative fatigue damage due to fatigue	TLAA, SRP-SLR Section 4.3 "Metal Fatigue"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-60	3.4-1, 037	Piping, piping components	Steel	Condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.SP-91	3.4-1, 040	Piping, piping components	Steel	Lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M39, "Lubricating Oil Analysis," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-136	3.4-1, 038	Piping, piping components	Steel	Raw water	Loss of material due to general, pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.SP-74	3.4-1, 014	Piping, piping components	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.S-16	3.4-1, 005	Piping, piping components	Steel	Treated water	Wall thinning due to flow-accelerated corrosion	AMP XI.M17, "Flow-Accelerated Corrosion"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-436	3.4-1, 089	Piping, piping components (for components not covered by NRC GL 89-13)	Steel, stainless steel, copper alloy	Raw water	Loss of material due to general (steel, copper alloy only), pitting, crevice corrosion, MIC; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
M	VIII.G.S-415	3.4-1, 068	Piping, piping components with internal coatings/linings	Gray cast iron, ductile iron, malleable iron with internal coating/ lining	Closed-cycle cooling water, raw water, treated water, waste water	Loss of material due to selective leaching	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VIII.G.S-483b	3.4-1, 135	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-478a	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M20, "Open-Cycle Cooling Water System"	No
-	VIII.G.S-478b	3.4-1, 130	Piping, piping components, heat exchanger components other than tubes	Titanium	Raw water	Cracking due to SCC, flow blockage due to fouling	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.S-401	3.4-1, 066	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water, raw water, treated water, lubricating oil	Loss of coating or lining integrity due to blistering, cracking, flaking, peeling, delamination, rusting, physical damage; loss of material or cracking for cementitious coatings/linings	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No
-	VIII.G.S-414	3.4-1, 067	Piping, piping components, heat exchangers, tanks with internal coatings/linings	Any material with an internal coating/ lining	Closed-cycle cooling water, raw water, treated water, lubricating oil	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-472	3.4-1, 123	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.S-429	3.4-1, 078	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
-	VIII.G.SP-147d	3.4-1, 035	Piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.G.S-457b	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-457e	3.4-1, 109	Piping, piping components, tanks	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.G.S-400a	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M20, "Open-Cycle Cooling Water System"	Yes
-	VIII.G.S-400b	3.4-1, 061	Piping, piping components, tanks	Metallic	Raw water, waste water	Loss of material due to recurring internal corrosion	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.G.SP-118a	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.G.SP-118b	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-118c	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	Yes
-	VIII.G.SP-118d	3.4-1, 002	Piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.G.SP-127d	3.4-1, 003	Piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.SP-162	3.4-1, 083	Tanks	Stainless steel, nickel alloy	Treated water	Loss of material due to pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.SP-75	3.4-1, 012	Tanks	Steel	Treated water	Loss of material due to general, pitting, crevice corrosion, MIC	AMP XI.M2, "Water Chemistry," and AMP XI.M32, "One-Time Inspection"	No
-	VIII.G.S-445a	3.4-1, 097	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.G.S-445b	3.4-1, 097	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-445c	3.4-1, 097	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.G.S-450a	3.4-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.G.S-450b	3.4-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-450c	3.4-1, 102	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Air, condensation, soil, concrete, raw water, waste water	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.G.S-444	3.4-1, 096	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VIII.G.S-448a	3.4-1, 100	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.G.S-448b	3.4-1, 100	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-448c	3.4-1, 100	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.G.S-449	3.4-1, 101	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VIII.G.S-447	3.4-1, 099	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VIII.G.S-446a	3.4-1, 098	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.G.S-446b	3.4-1, 098	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.G.S-446c	3.4-1, 098	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.G.SP-116	3.4-1, 030	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel	Soil, concrete, air, condensation	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VIII.G.S-405	3.4-1, 062	Tanks within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Steel, stainless steel, aluminum	Treated water	Loss of material due to general (steel only), pitting, crevice corrosion, MIC (steel, stainless steel only)	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
D	VIII.G.S-31	-	-	-	-	-	-	-
D	VIII.G.S-402	-	-	-	-	-	-	-

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
D	VIII.G.S-420	-	-	-	-	-	-	-
D	VIII.G.S-421	-	-	-	-	-	-	-
D	VIII.G.S-440	-	-	-	-	-	-	-
D	VIII.G.S-441	-	-	-	-	-	-	-
D	VIII.G.S-457a	-	-	-	-	-	-	-
D	VIII.G.S-458a	-	-	-	-	-	-	-
D	VIII.G.S-458b	-	-	-	-	-	-	-
D	VIII.G.S-458c	-	-	-	-	-	-	-
D	VIII.G.S-458d	-	-	-	-	-	-	-
D	VIII.G.S-459a	-	-	-	-	-	-	-
D	VIII.G.S-459b	-	-	-	-	-	-	-
D	VIII.G.S-459c	-	-	-	-	-	-	-
D	VIII.G.S-466	-	-	-	-	-	-	-
D	VIII.G.S-467	-	-	-	-	-	-	-
D	VIII.G.SP-127e	-	-	-	-	-	-	-
D	VIII.G.SP-145	-	-	-	-	-	-	-
D	VIII.G.SP-147e	-	-	-	-	-	-	-
D	VIII.G.SP-94	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; GL = Generic Letters; MIC = microbiologically influenced corrosion; NRC = U.S. Nuclear Regulatory Commission; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

H EXTERNAL SURFACES OF COMPONENTS AND MISCELLANEOUS BOLTING

Systems, Structures, and Components

This section includes the aging management programs for the degradation of external surfaces of structures and components, including closure bolting in the steam and power conversion systems in PWRs and BWRs. For the steel components in PWRs, this section addresses only boric acid corrosion of external surfaces as a result of dripping borated water leaking from an adjacent PWR component.

System Interfaces

The structures and components covered in this section belong to the Steam and Power Conversion Systems in PWRs and BWRs (for example, see system interfaces in VIII.A to VIII.G for details).

Table H.1 External Surfaces of Components and Miscellaneous Bolting

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-03	3.4-1, 007	Closure bolting	High-strength steel	Air, soil, underground	Cracking due to stress corrosion cracking (SCC); cyclic loading	AMP XI.M18, "Bolting Integrity"	No
-	VIII.H.SP-142	3.4-1, 006	Closure bolting	Metallic	Any, soil, underground	Loss of preload due to thermal effects, gasket creep, self-loosening	AMP XI.M18, "Bolting Integrity"	No
-	VIII.H.S-421	3.4-1, 073	Closure bolting	Stainless steel	Air, soil, concrete, underground, waste water	Cracking due to SCC	AMP XI.M18, "Bolting Integrity"	No
-	VIII.H.S-418	3.4-1, 070	Closure bolting	Stainless steel, steel, nickel alloy, copper alloy	Lubricating oil, treated water, treated borated water, raw water, waste water	Loss of material due to general (steel; copper alloy in raw water, waste water only), pitting, crevice corrosion, microbiologically influenced corrosion (MIC) (raw water, waste water environments only)	AMP XI.M18, "Bolting Integrity"	No
-	VIII.H.SP-141	3.4-1, 050	Closure bolting	Steel	Soil, concrete, underground	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VIII.H.S-02	3.4-1, 009	Closure bolting	Steel, stainless steel, nickel alloy	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general (steel only), pitting, crevice corrosion	AMP XI.M18, "Bolting Integrity"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-29	3.4-1, 034	External surfaces	Steel	Air – indoor uncontrolled, air – outdoor, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
--	VIII.H.S-30	3.4-1, 004	External surfaces	Steel	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
	VIII.H.S-426	3.4-1, 075	Heat exchanger tubes	Stainless steel, steel, aluminum, copper alloy, titanium	Air, condensation	Reduction of heat transfer due to fouling	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VIII.H.S-453a	3.4-1, 105	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.H.S-453b	3.4-1, 105	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.H.S-453c	3.4-1, 105	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-453d	3.4-1, 105	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-468a	3.4-1, 119	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.H.S-468b	3.4-1, 119	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.H.S-468c	3.4-1, 119	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-468d	3.4-1, 119	Insulated piping, piping components, tanks	Aluminum	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-452a	3.4-1, 104	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.H.S-452b	3.4-1, 104	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.H.S-452c	3.4-1, 104	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-452d	3.4-1, 104	Insulated piping, piping components, tanks	Stainless steel	Air, condensation	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-451a	3.4-1, 103	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	Yes
-	VIII.H.S-451b	3.4-1, 103	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.H.S-451c	3.4-1, 103	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-451d	3.4-1, 103	Insulated piping, piping components, tanks	Stainless steel, nickel alloy	Air, condensation	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-402a	3.4-1, 063	Insulated piping, piping components, tanks	Steel, copper alloy (>15% Zn or >8% Al)	Air, condensation	Loss of material due to general (steel only), pitting, crevice corrosion; cracking due to SCC (copper alloy (>15% Zn or >8% Al) only)	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VIII.H.S-402b	3.4-1, 063	Insulated tanks (within the scope of AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks")	Steel	Air, condensation	Loss of material due to general, pitting, crevice corrosion	AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks"	No
-	VIII.H.S-403	3.4-1, 064	Non-metallic thermal insulation	Any	Air, condensation	Reduced thermal insulation resistance due to moisture intrusion	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-457c	3.4-1, 109	Piping, piping components	Aluminum	Air, condensation, raw water, waste water	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes
-	VIII.H.S-477	3.4-1, 129	Piping, piping components	Copper alloy	Soil, underground	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VIII.H.S-454	3.4-1, 106	Piping, piping components	Copper alloy (>15% Zn or >8% Al)	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VIII.H.S-479	3.4-1, 131	Piping, piping components	Copper alloy (>15% Zn)	Air with borated water leakage	Loss of material due to boric acid corrosion	AMP XI.M10, "Boric Acid Corrosion"	No
-	VIII.H.S-483a	3.4-1, 135	Piping, piping components, ducting, ducting components, seals	Polymeric	Air, condensation, raw water, raw water (potable), treated water, waste water, underground, concrete, soil	Hardening or loss of strength due to polymeric degradation; loss of material due to peeling, delamination, wear; cracking or blistering due to exposure to ultraviolet light, ozone, radiation, or chemical attack; flow blockage due to fouling	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-471	3.4-1, 122	Piping, piping components, seals	Elastomer	Air	Loss of material due to wear	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VIII.H.S-428	3.4-1, 077	Piping, piping components, seals	Elastomer	Air, condensation	Hardening or loss of strength due to elastomer degradation	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
-	VIII.H.S-466	3.4-1, 117	Piping, piping components, tanks	Aluminum	Soil, concrete	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VIII.H.S-460a	3.4-1, 112	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.H.S-460b	3.4-1, 112	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-460c	3.4-1, 112	Piping, piping components, tanks	Aluminum	Underground	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-442a	3.4-1, 094	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.H.S-442b	3.4-1, 094	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	VIII.H.S-442c	3.4-1, 094	Piping, piping components, tanks	Aluminum	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-474	3.4-1, 125	Piping, piping components, tanks	Polyvinyl chloride	Soil	Loss of material due to wear	AMP XI.M41, "Buried and Underground Piping and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
N	VIII.H.S-484	3.4-1, 125	Piping	Carbon Fiber Reinforced Polymer	Soil	Loss of material, cracking, and blistering due to general corrosion (steel only), erosion, chemical attack, moisture, or wear	AMP XI.M43, “High Density Polyethylene (HDPE) Piping and Carbon Fiber Reinforced Polymer (CFRP) Repaired Piping”	No
-	VIII.H.S-425a	3.4-1, 074	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M32, "One-Time Inspection"	Yes
-	VIII.H.S-425b	3.4-1, 074	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	VIII.H.S-425c	3.4-1, 074	Piping, piping components, tanks	Stainless steel	Underground	Cracking due to SCC	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-443a	3.4-1, 095	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M32, "One-Time Inspection"	Yes

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.S-443b	3.4-1, 095	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M41, "Buried and Underground Piping and Tanks"	Yes
-	VIII.H.S-443c	3.4-1, 095	Piping, piping components, tanks	Stainless steel, nickel alloy	Underground	Loss of material due to pitting, crevice corrosion	AMP XI.M42, "Internal Coatings/ Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks"	Yes
-	VIII.H.S-420	3.4-1, 072	Piping, piping components, tanks	Stainless steel, steel, aluminum	Soil, concrete	Cracking due to SCC (steel in carbonate/ bicarbonate environment only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VIII.H.SP-161	3.4-1, 050	Piping, piping components, tanks	Steel	Soil, concrete, underground	Loss of material due to general, pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground piping and Tanks"	No
-	VIII.H.SP-143	3.4-1, 048	Piping, piping components, tanks, closure bolting	Nickel alloy	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No

New, Modified, Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.H.SP-145	3.4-1, 047	Piping, piping components, tanks, closure bolting	Stainless steel	Soil, concrete	Loss of material due to pitting, crevice corrosion, MIC (soil only)	AMP XI.M41, "Buried and Underground Piping and Tanks"	No
-	VIII.H.S-455	3.4-1, 107	Tanks	Copper alloy (>15% Zn or >8% Al)	Air, condensation	Cracking due to SCC	AMP XI.M36, "External Surfaces Monitoring of Mechanical Components"	No
D	VIII.H.S-40	-	-	-	-	-	-	-
D	VIII.H.S-41	-	-	-	-	-	-	-
D	VIII.H.S-416	-	-	-	-	-	-	-
D	VIII.H.S-417	-	-	-	-	-	-	-
D	VIII.H.S-419	-	-	-	-	-	-	-
D	VIII.H.S-42	-	-	-	-	-	-	-
D	VIII.H.S-431	-	-	-	-	-	-	-
D	VIII.H.S-456	-	-	-	-	-	-	-
D	VIII.H.S-470	-	-	-	-	-	-	-
D	VIII.H.SP-144	-	-	-	-	-	-	-
D	VIII.H.SP-149	-	-	-	-	-	-	-
D	VIII.H.SP-150	-	-	-	-	-	-	-
D	VIII.H.SP-151	-	-	-	-	-	-	-
D	VIII.H.SP-82	-	-	-	-	-	-	-
D	VIII.H.SP-83	-	-	-	-	-	-	-
D	VIII.H.SP-84	-	-	-	-	-	-	-

AMP = aging management program; CERP = Carbon Fiber Reinforced Polymer; MIC = microbiologically influenced corrosion; SCC = stress corrosion cracking; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

I COMMON MISCELLANEOUS MATERIAL/ENVIRONMENT COMBINATIONS

Systems, Structures, and Components

This section includes the aging management programs (AMPs) for miscellaneous material/environment combinations that may be found throughout the steam and power conversion system's structures and components (SCs). For the material/environment combinations in this part, aging effects are not expected to degrade the ability of the structure or component to perform its intended function for the subsequent period of extended operation. With the exception of components within the scope of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, or for those where a further evaluation results in identifying aging effects and a corresponding AMP, no AMPs for these SCs are required.

System Interfaces

The SCs covered in this section belong to the steam and power conversion system in pressurized water reactors and boiling water reactors (for example, see system interfaces in VIII.A to VIII.G for details).

Table I.1 Common Miscellaneous Material/Environment Combinations

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.I.SP-33	3.4-1, 055	Piping elements	Glass	Air-	None	None	No
-	VIII.I.SP-67	3.4-1, 055	Piping elements	Glass	Air with borated water leakage	None	None	No
-	VIII.I.SP-70	3.4-1, 055	Piping elements	Glass	Closed-cycle cooling water	None	None	No
-	VIII.I.SP-68	3.4-1, 055	Piping elements	Glass	Condensation	None	None	No
-	VIII.I.SP-69	3.4-1, 055	Piping elements	Glass	Gas	None	None	No
-	VIII.I.SP-10	3.4-1, 055	Piping elements	Glass	Lubricating oil	None	None	No
-	VIII.I.SP-34	3.4-1, 055	Piping elements	Glass	Raw water	None	None	No
-	VIII.I.SP-35	3.4-1, 055	Piping elements	Glass	Treated water	None	None	No
-	VIII.I.SP-23	3.4-1, 052	Piping, piping components	Aluminum	Gas	None	None	No
-	VIII.I.SP-6	3.4-1, 054	Piping, piping components	Copper alloy	Air, condensation, gas	None	None	No
-	VIII.I.S-476	3.4-1, 128	Piping, piping components	Copper alloy	Concrete	None	None	No
-	VIII.I.SP-104	3.4-1, 053	Piping, piping components	Copper alloy, copper alloy (>8% Al)	Air with borated water leakage	None	None	No
-	VIII.I.SP-148	3.4-1, 056	Piping, piping components	Nickel alloy	Air with borated water leakage	None	None	No
-	VIII.I.SP-152	3.4-1, 057	Piping, piping components	Polyvinyl chloride (PVC)	Air – indoor uncontrolled	None	None	No
-	VIII.I.SP-153	3.4-1, 057	Piping, piping components	PVC	Condensation	None	None	No
-	VIII.I.SP-13	3.4-1, 082	Piping, piping components	Stainless steel	Concrete	None	None	Yes
-	VIII.I.SP-15	3.4-1, 058	Piping, piping components	Stainless steel	Gas	None	None	No
-	VIII.I.SP-1	3.4-1, 059	Piping, piping components	Steel	Air – indoor controlled	None	None	No

New, Modified Deleted, Edited Item	Item	Standard Review Plan (SRP) Item (Table, ID)	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)/Time-Limited Aging Analysis (TLAA)	Further Evaluation
-	VIII.I.SP-154	3.4-1, 051	Piping, piping components	Steel	Concrete	None	None	Yes
-	VIII.I.SP-4	3.4-1, 059	Piping, piping components	Steel	Gas	None	None	No
-	VIII.I.S-465	3.4-1, 126	Piping, piping components, heat exchanger components other than tubes	Titanium (ASTM Grades 1, 2, 7, 9, 11, or 12)	Closed-cycle cooling water	None	None	No
-	VIII.I.S-463	3.4-1, 115	Piping, piping components, heat exchanger components other than tubes	Titanium (ASTM Grades 1, 2, 7, 9, 11, or 12)	Treated water	None	None	No
-	VIII.I.S-475	3.4-1, 127	Piping, piping components, tanks	Aluminum	Air with borated water leakage	None	None	No
-	VIII.I.S-473	3.4-1, 124	Piping, piping components, tanks	PVC	Concrete	None	None	No
-	VIII.I.S-480	3.4-1, 132	Piping, piping components, tanks	Stainless steel	Air with borated water leakage	None	None	No
D	VIII.I.S-404	-	-	-	-	-	-	-
D	VIII.I.S-435	-	-	-	-	-	-	-
D	VIII.I.S-461	-	-	-	-	-	-	-
D	VIII.I.SP-108	-	-	-	-	-	-	-
D	VIII.I.SP-11	-	-	-	-	-	-	-
D	VIII.I.SP-111	-	-	-	-	-	-	-
D	VIII.I.SP-12	-	-	-	-	-	-	-
D	VIII.I.SP-5	-	-	-	-	-	-	-
D	VIII.I.SP-86	-	-	-	-	-	-	-
D	VIII.I.SP-9	-	-	-	-	-	-	-
D	VIII.I.SP-93	-	-	-	-	-	-	-

AMP = aging management program; ASTM = ASTM International; PVC = polyvinyl chloride; SRP = Standard Review Plan; TLAA = Time-Limited Aging Analysis.

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Draft NUREG-2191, Vol. 1, Rev. 1, "Generic Aging Lessons Learned for Subsequent License Renewal Draft Report for Comment," (GALL-SLR Report) provides guidance to applicants on the content of applications for renewal of the initial renewed operating license, referred to as "subsequent license renewal" (SLR). Draft NUREG–2191 contains the U.S. Nuclear Regulatory Commission (NRC) staff's generic evaluation of plant aging management programs (AMPs) and establishes the technical basis for their adequacy. The report is revised to incorporate interim staff guidance and lessons learned.

This document is a companion document to Draft NUREG–2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants, Draft Report for Comment" (SRP SLR), Revision 1, that provides guidance to NRC staff on the review of SLR applications. The staff also published Draft NUREG-2221, Supplement 1, "Technical Bases for Changes in the Subsequent License Renewal Guidance Documents NUREG–2191 and NUREG–2192" (Technical Basis Document). Comments on the revised documents will be considered, as appropriate, in the final versions of these documents.

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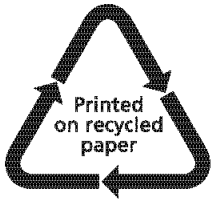

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