NUREG-1832

Analysis of Public Comments on the Revised License Renewal Guidance Documents

Manuscript Completed: September 2005
Date Published: TBD

Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

This Page Intentionally Left Blank

ABSTRACT

This report contains the staff's analysis of the comments received on the draft license renewal guidance (LRG) documents. These LRG documents consist of:

- Draft Generic Aging Lessons Learned (GALL) Report (NUREG-1801), Revision 1;
- Draft Standard Review Plan for License Renewal (NUREG-1800), Revision 1; and
- Draft Regulatory Guide DG-1104, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses."

The staff proposed to update these LRG documents, which were previously published in 2001 (each of which is referred to as Revision 0). The draft revisions of these LRG documents were issued for public comment on February 1, 2005 (70FR 5254).

The staff's analysis of these comments is presented in a tabular format and contained in the following appendices:

- Appendix A addresses comments submitted by NEI;
- Appendix B addresses comments from the Advisory Committee on Reactor Safety;
- Appendix C addresses comments from the participants at the license renewal public workshop held on March 2, 2005;
- Appendix D addresses comments submitted by various stakeholders, such as the Union of Concerned Scientists, utilities, and private citizens; and
- Appendix E is a comparison of unique aging management review (AMR) line-items in the September 2005 revision of the GALL Report, to that presented in the January 2005 Draft Revision of the GALL Report issued for public comment.

No comments were received on DG-1140.

The September 2005 version of these LRG documents (referred to as Revision 1) incorporated changes to the draft revision based on the information contain in this report.

This Page Intentionally Left Blank

TABLE OF CONTENTS

LIST OF TABLES

LIST OF CONTRIBUTORS

<u>License Renewal and Environmental Programs Section of Division of Regulatory Improvement Programs, Office of Nuclear Reactor Regulation</u>

P.T. Kuo	Program Director
S. Lee	Section Chief
J. Zimmerman	Section Chief
J. Dozier	Team Leader
K. Chang	Mechanical Engineering
K. Cozens	Materials Engineering
G. Cranston	Reactor Systems Engineering
M. Heath	Mechanical Engineering
A. Hull	Materials Engineering
K. Hsu	Materials Engineering
M. Lintz	Mechanical Engineering
K. Naidu	Reactor Engineering
T. Terry	Mechanical Engineering
L. Tran	Electrical Engineering

<u>Office of Nuclear Reactor Regulation</u>

T. Chan	Section Chief
R. Jenkins	Section Chief
L. Lund	Section Chief
R. Karas	Section Chief
K. Manoly	Section Chief
M. Mitchell	Section Chief
H. Ashar	Structural Engineering
B. Elliot	Materials Engineering
N. Iqbal	Fire Protection Engineering
D. Jeng	Structural Engineering
K. Karwoski	Materials Engineering
Y. Li	Mechanical Engineering
R. McNally	Mechanical Engineering
J. Medoff	Materials Engineering
D. Nguyen	Electrical Engineering
A. Pal	Electrical Engineering

<u>Office of Nuclear Regulatory Research</u>

A. Hiser	Section Chief
J. Vora	Team Leader
J. Davis	Materials Engineering
P. Kang	Electrical Engineering

LIST OF CONTRIBUTORS (continued)

Parallax, Inc

A. Baione	Team Leader
M. Bowman	Mechanical Engineering
K. Larsen	Technical Editing
E. Patel	Mechanical Engineering
R. Wells	License Engineering

Argonne National Laboratory

O. Chopra	Team Leader
D. Diercks	Materials Engineering

EXECUTIVE SUMMARY

OVERVIEW

On February 1, 2005 (70FR 5254), the Nuclear Regulatory Commission (NRC) announced the issuance and availability of the following license renewal guidance (LRG) documents for public comment:

- Draft Generic Aging Lessons Learned (GALL) Report (NUREG-1801), Revision 1
- Draft Standard Review Plan for License Renewal (NUREG-1800), Revision 1, and
- Draft Regulatory Guide DG-1104, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses."

These LRG documents describe methods acceptable to the staff for implementing the license renewal rule (10 CFR Part 54), as well as techniques used by the staff in evaluating applications for license renewal. The draft revision incorporated changes that reflected past precedents and other lessons learned since Revision 0, which were published in 2001.

The draft revision of these LRG documents was issued for public comment on January 31, 2005. In addition, the staff also held public meetings with stakeholders to facilitate and to discuss comments.

The staff has taken into consideration comments received as a result of the solicitation described above and incorporated its dispositions into the September 2005 versions of the LRG documents. There were no comments received on DG-1140.

This report provides the evaluation and disposition of public comments received by the NRC on the draft revision of license renewal guidance documents.

This Page Intentionally Left Blank

1. INTRODUCTION

1.1 BACKGROUND

On February 1, 2005 (70FR 5254), the Nuclear Regulatory Commission (NRC) announced the issuance and availability of the following license renewal guidance (LRG) documents:

- Draft Generic Aging Lessons Learned (GALL) Report (NUREG-1801), Revision 1
- Draft Standard Review Plan for License Renewal (NUREG-1800), Revision 1, and
- Draft Regulatory Guide DG-1104, “Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses.”

These draft revision of the LRG documents describe methods acceptable to The staff for implementing the license renewal rule (10 CFR Part 54), as well as techniques used by The staff in evaluating applications for license renewals. These draft revision incorporated changes that reflected past precedents and other lessons learned since Revision 0, which were published in 2001 (70 FR 5254).

The staff had previously made available to the public a draft preliminary version of portions of these LRG documents on September 31, 2004. These preliminary draft versions were also discussed in public meetings held on October 27, 2004 and December 1, 2004. Subsequently, these LRG documents were formally issued for public comment, as discussed above. After the documents were issued for public comment, the staff held a public workshop on March 2, 2005, to discuss the changes made to these documents and to facilitate gathering of public comments. The staff was especially interested in stakeholder comments that address the safety, effectiveness, and efficiency of the license renewal process.

1.2 ORGANIZATION OF REPORT

The staff’s analysis of these comments is presented in a tabular format and contained in the following appendices:

- Appendix A addresses the specific written comments submitted by NEI;
- Appendix B addresses the Advisory Committee on Reactor Safety comments,
- Appendix C addresses the participant comments from the license renewal public workshop on March 2, 2005; and
- Appendix D addresses the written comments submitted by various stakeholders, such as the Union of Concerned Scientists, utilities, and private citizens;
- Appendix E is a comparison of Unique Aging Management Reviews (AMR) in the September 2005 revision of the GALL Report, to that presented in the January 2005 Draft Revision of the GALL Report issued for public Comment.

No comments were received on DG-1140.

This Page Intentionally Left Blank

APPENDIX A:
Disposition of NEI Comments

A.1. INTRODUCTION

The Nuclear Energy Institute (NEI) provided comments on the SRP-LR and the GALL Report during the public comment period. The complete text of the NEI comments may be found in ADAMS Accession No. ML050970288. The tables in this Appendix provide a NEI comment summary, NEI basis, and NRC Disposition for the comment.

A.2. EVALUATION AND DISPOSITION OF COMMENTS

Tables in this Appendix address each comment and are arranged to correspond to the individual section of the updated license renewal guidance documents and are identified uniquely. For example, Table A.2.1 contains the NEI comments relating to Chapter II of the GALL Report. The Comment Number (i.e., G.II-GC-1) identifies and provides additional information regarding the comment. The first digit indicates the document to which the comment pertains. For example "G" indicates the GALL Report and an "S" represents the SRP-LR. The next part of the identifier indicates the chapter to which the comment applies, such as "II" for chapter II, "III" for chapter III, etc. The next part of the identifier indicates the type of comment. For example GC indicates a generic comment that applies to several places in the document, and S indicates a specific comment to a particular portion of the document. The last part of the identifier is a sequence number to make each of the comment numbers unique.

Additionally, within each table, the second column contains an item number column that provides the location in the document where the comment applies. For example, comment number G.II-GC-2 applies to GALL AMR line-items C-05 and C-42. The Comment/Proposed Change column provides a summary of the NEI comment. A summary of the comment is used in order to address similar comments that may be made by NEI in multiple places within the applicable section of the updated license renewal documents. The NEI basis is provided in the "Basis for Comment" column and the final column presents the staff's disposition and evaluation of the comment.

This Page Intentionally Left Blank

Table A.2.1: Disposition of NEI Comments on Chapter II of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G.II-GC-1	Several	Composite Component Descriptions - The combination of some lines to produce generic lines resulted in structure/component descriptions that included all the components previously (GALL'01) listed in the individual lines. These comprehensive lists include components that do not apply to all system/structure tables. For example, in table II.B2.2 for Mark II BWR containments, line C-19 addresses steel elements including "Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; emergency core cooling system (ECCS) suction header." Some of these components (e.g., torus and torus ring girder) are not applicable to Mark II BWR containments and may lead to confusion when comparing plant AMR results to this AMR line-item of the GALL Report.	The compound names will create confusion because specific component types are listed in structures that don't contain those components. The descriptions in the rolled up lines should be split to their original configuration so that the list of structural component types matches the structure (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The line-items in the GALL Report were revised so that component type matched the containment type. New line-items were created in the GALL Report to make it consistent with the GALL'01 version. C-01 becomes C-01, C-28, and C-29. C-02 becomes C-02, C-30, C-31, and C-32. C-03 becomes C-03, C-25, and C-27. C-04 becomes C-04, C-38, C-39, and C-40. C-05 becomes C-05, C-41, C-42, and C-43. C-06 becomes C-06, C-36, and C-37. C-08 becomes C-08, C-33, C-34, and C-35. C-13 becomes C-13 and C-45. C-14 becomes C-14 and C-44. C-19 becomes C-19 and C-46. C-20 becomes C-20 and C-47. C-21 becomes C-21 and C-48 C-22 becomes C-22 and C-49. The GALL Report was revised to address these proposed changes.
G.II-GC-2	C-05 C-42	NEI recommended in the AMP column be changed as follows: Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of ~~increase in porosity and permeability,~~	NEI stated that incorrect aging mechanism listed under the AMP for the aging mechanism specified in the previous column (see also the endnotes to this table for NEI's presentation of general comment 2).	The staff agreed with this comment. This was an error in the GALL Report. The GALL Report was revised to address the proposed changes for C-05, and the new items C-41, C-42, and C-43. These new items in the GALL Report were

Table A.2.1: Disposition of NEI Comments on Chapter II of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		cracking, loss of bond, and loss of material (spalling, scaling) due to ~~aggressive chemical attack~~ ***corrosion of embedded steel***.		revised as follow: "Inspections performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel."
G.II.C-1	C-02	NEI proposed eliminate the period in the AMP column under inaccessible areas.	It is a corrected typo -Eliminate "period" (.) This comment also applies to II.A2-3 (C-02) and II.B2.2-2, (C-02), II.B3.1-2 (C-02), II.B3.2-3 (C-02).	The staff agreed with this comment. The GALL Report was revised to address the proposed changes for C-02, and the new items C-30, C-31, and C-32.
G.II-C-2	C-08	NEI proposed delete "concrete fill in annulus" from Region of interest column.	NEI stated industry does not recognize this component in the PWRs Concrete Elements (Concrete Containments).	The staff agreed with this comment. The GALL Report was revised to delete concrete fill in annulus for the concrete containment section. However, it is retained in the section pertaining to the Mark III containment. New line-items were created in the GALL Report. C-08 becomes C-08, C-33, C-34, and C-35.
G.II-C-3	C-04	NEI recommended the aging effect mechanism be changed as follows: ~~Expansion and c~~ ***C***racking ***due to expansion/*** reaction with aggregates In the AMP column delete: And replace with: **"**As described in NUREG-1557,	NEI proposed to change the aging effect/mechanism, so it will be consistent with previous GALL version.	The staff agreed with this comment. The staff agreed that the proposed change in the aging effect/aging mechanism column is acceptable because it is identical to the GALL'01 version. The staff agreed that the proposed change in the AMP column is acceptable because it is consistent with the GALL'01 version.

Table A.2.1: Disposition of NEI Comments on Chapter II of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77. Therefore, if these conditions are satisfied, aging management is not necessary.**"**		The GALL Report was revised to address the proposed changes for C-04, and the new AMR line-items C-38, C-39, and C-40.
G.II-C-4	C-05	NEI recommended the components and materials be changed as follows: Dome; wall; basemat; ring girders; buttresses; ~~reinforcing steel~~ Concrete; ~~steel~~	NEI proposed the aging effect is for concrete not steel.	The staff did not agree with this comment. The staff did not agree with deleting reinforcing steel in component and steel in the material because the aging mechanism is corrosion of embedded steel. The GALL Report was not revised to address these proposed changes.
G.II-C-5	C-09	NEI recommended the environment and aging effect/mechanism be changed as follows: Air – indoor uncontrolled ~~or air – outdoor~~ Loss of material/ general~~, pitting, and crevice~~ corrosion	NEI proposed in the environment that liners are only exposed to an air-indoor uncontrolled environment. Loss of material due to pitting and crevice corrosion is not applicable for air – indoor uncontrolled environment. Air –	The staff agreed with this comment. The GALL Report was revised to address the proposed changes since liners are not exposed to air-outdoor environment. The staff did not agree with deleting pitting and crevice in the aging effect/mechanism because it is not consistent with the GALL'01 version.

Table A.2.1: Disposition of NEI Comments on Chapter II of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			indoor uncontrolled environment is defined as a normally dry environment and crevice and pitting occur in a wetted environment per GALL Chapter IX.	The GALL Report was not revised to address this proposed change.
G.II-C-6	C-13 C-14 C-15	NEI recommended the environment be changed as follows: Air – indoor uncontrolled ***or air outdoor***	NEI stated this item component is same as II.A3-1 which lists "Air –indoor uncontrolled or air outdoor.	The staff agreed with this comment. The staff agreed that the comment as proposed is acceptable because it is identical to the GALL'01 version. The GALL Report was revised to address this proposed change.
G.II-C-7	C-23	NEI recommended the material be changed as follows: Steel; ~~Graphite plate~~	NEI proposed that the industry experience and EPRI Civil Tools indicates this aging effect is not applicable to graphite plate (lubrite). This is consistent with past approved applications. See NUREG-1759.	The staff agreed with this comment. The GALL Report was revised to delete graphite plate since the aging effect of fretting or lockup is not applicable to graphite plate (or lubrite).
G.II-C-8	C-19	NEI recommended the environment be changed as follows: Air – indoor uncontrolled ***or treated water (as applicable)***	NEI proposed that add "or treated water" to environment column to account for the wetted portion of the torus and other components inside the torus.	The staff agreed with this comment. The GALL Report was revised to add or treated water since treated water is an applicable environment for the torus and other components inside the torus.
G.II-C-9	C-22	NEI recommended the component, material, environment, and aging effect/mechanism to be changed as follows: Steel elements: Vent line bellows ***Suppression chamber liner***	Add steel to account for suppression chamber with carbon steel liner. Add treated water to account for the wetted portion of the suppression pool. Add loss of material aging	The staff agreed with this comment with modifications. The staff agreed with the change proposed by NEI for item II.B2.2.2-b (C-22), except that steel is not a material used for suppression chamber liner. Change in component type was

Table A.2.1: Disposition of NEI Comments on Chapter II of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		(interior surface) ***Steel or*** Stainless steel Air – indoor uncontrolled ***or treated water*** Loss of material/ general, pitting, and crevice corrosion ~~Cracking/ stress corrosion cracking~~ ***GALL AMP XI.S1 and GALL AMP XI.S4***	effect. Delete cracking due to SCC because suppression chamber temperature is < 140^{0}F	addressed by comment G.II-GC-1 above. A new AMR line-item C-49 was added to the GALL Report specifically to address stainless steel suppression chamber liner in treated water with an aging effect for loss of material due to general, pitting and crevice corrosion. Cracking due to SCC is not an aging effect because the treated water in suppression chamber is <140^{0}F. The AMPs recommended are GALL AMP XI.S1, “ASME Section XI, Subsection IWE, “and GALL AMP XI.S4, “10 CFR Part 50, Appendix J.”

Endnotes Clarifying General Comments Provided by NEI

1. General Comment 1 (GC1): Composite Component Descriptions

The combination of some lines to produce generic lines resulted in structure/component descriptions that included the components previously (GALL'01) listed in the individual lines. These comprehensive lists include components that do not apply to system/structure tables. For example, in table II.B2.2 for Mark II BWR containments, line-itemC-19 addresses steel elements including "Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; ECCS suction header." Some of these components (e.g., torus and torus ring girder) are not applicable to Mark II BWR containments and may lead to confusion when comparing plant AMR results to this line-item of GALL.

The compound names will create confusion because specific component types are listed in structures that don't contain those components. The descriptions in the rolled up lines should be split to their original configuration so that the list of structural component types matches the structure.

2. General Comment 2 (GC2: Mechanism/Program Mismatch

The aging mechanism in 'Aging Effect/Mechanism' column does not match with description in 'AMP' column for some lines. For example, item II.A2-7 calls out 'corrosion of embedded steel' in Mechanism but describes 'aggressive chemical attack' in AMP. Corrections have been proposed.

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G.III-GC-1	All Items	NEI recommended reducing the number of sub-sections from 9 to 3.	The tables of Chapter III for the various structures and component supports are highly repetitive. To simplify these GALL tables, the nine structures tables have been consolidated into three tables. Tables A1, A2, A3, A4, A5, and A9 comprise a new Group 1 Structures Table; Table A6 becomes a new Group 2 Structures Table; and Tables A7 and A8 are joined to become a new Group 3 Structures Table. Similarly, the three ASME piping supports tables B1.1, B1.2 and B1.3 are combined as a table for supports for ASME piping and components and Class MC (BWR Containment Supports); and the remaining four tables have been combined as a table for other supports (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff did not agree with this comment to reduce the number of sub-sections from 9 to 3 because it does not meet the requirements of 10 CFR 54.21a (1), and it is not consistent with the format of GALL Chapter II. The GALL Report was not revised to address these proposed changes.
G.III-GC-2a	TP-10	NEI recommended the creation of new AMR line-items for aging effects and mechanisms of loss of material/general crevice, pitting corrosion of carbon and stainless steel supports members, welds,	NEI stated that this new AMR line-item applies to cover BWR support components in treated water (see also the endnotes to this table for NEI's presentation of general	The staff agreed with the proposed change. A treated water environment could be present in BWR torus/suppression pool. A new AMR line-item TP-10 was added to GALL Chapter IIIB1.

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		bolded connections, support anchorage to building structure in a treated water environment. The aging management program recommended by NEI was GALL AMP XI.M2 "Water Chemistry Program."	comment 2).	The staff agreed that the GALL AMP XI.M2 in the AMP column for this new AMR line-item was appropriate. The verification of water chemistry was added. The GALL Report was revised to address these proposed changes.
G.III-GC-2b	III.B2(1)	NEI recommended the creation of new AMR line-items for aging effects and mechanisms of loss of material/general corrosion of galvanized steel supports members, welds, bolted connections, and support anchorage to building structure in an outdoor air environment. The aging management program recommended by NEI was GALL AMP XI.S6 "Structures Monitoring Program."	NEI stated that this past precedent was in the Robinson SER (NUREG 1785), where this material, environment, aging effect/mechanism, and aging management program (MEAP) combination was used. (see also the endnotes to this table for NEI's presentation of general comment 2).	See G.III-C-9 below
G.III-GC-2c	III.B2(2)	NEI recommended the creation of new AMR line-items for aging effects and mechanisms of loss of material due to change in material properties of wood. The aging management program recommended by NEI was GALL AMP XI.S6 "Structures Monitoring Program," and GALL AMP XI.S7 RG, Inspection of Water-Controlled Structures, or Plant-specific AMP."	NEI stated that this new AMR line-item was added to include component supports and water control structures, small dams and ponds, and power poles. This material is not in GALL (see also the endnotes to this table for NEI's presentation of general comment 2).	The staff reviewed these components and did not agree to add this AMR line-item because wood needs more criteria, it is too general, and also this MEAP combination would be plant-specific. The GALL Report was not revised to address these proposed changes.
G.III-GC-3a	T-05	NEI recommended the AMP be changed as follows:	NEI stated that dissimilar aging effects were identified in the AMP column and in the	The staff agreed with this comment. This was a typo that needed to be corrected.

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		Accessible Areas: Inspections performed in accordance with ***SMP***~~IWL~~ will indicate the presence of ~~increase in porosity and permeability,~~ cracking, ***loss of bond, and*** ~~or~~ loss of material (spalling, scaling) due to ***corrosion of embedded steel*** ~~aggressive chemical attack~~	AE/M column (see also the endnotes to this table for NEI's presentation of general comment 3).	The GALL Report was revised to address these proposed changes.
G.III-GC-3b	T-02 T-05	NEI recommended the AMP be changed as follows: GALL AMP XI.S~~2~~***6***, "***Structures Monitoring Program (SMP)*** ~~ASME Section XI, Subsection IWL~~." Accessible areas: Inspections performed in accordance with ~~IWL~~ ***SMP*** will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.	NEI proposed that IWL is for inspection of the reinforced concrete Containment and is not used to inspect other structures. The SMP is utilized for the inspection of these other structures in the sections listed, which is consistent with previous versions of GALL (see also the endnotes to this table for NEI's presentation of general comment 3).	The staff agreed that the NEI proposed change in AMP column is acceptable because it is identical with GALL'01 and IWL is used in Containment, while Section III is associated with other Class 1 and 2 structures. AMP GALL XI.S6 was revised also. The GALL Report was revised to address these proposed changes.
G.III-GC-4a	T-18 T-19	NEI recommended the AMP be changed as follows: Accessible Areas: Inspections performed in accordance with "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC/US Army Corp of Engineers dam inspections and maintenance or the Structures Monitoring Program will indicate	NEI stated the text was not consistent with other sections of GALL because there was no discussion of accessible and inaccessible concrete. It is also not consistent with the NRC's requirement in ISG-3 and other sections of GALL (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff agreed that the text should be consistent with other structural sections of GALL and address accessible and inaccessible concrete. The staff agreed with the accessible concrete change, but did not agree with including SMP. The staff has modified the inaccessible area write-up to appropriately address non-aggressive and aggressive environment as follows: Inaccessible Areas: For plants with non-aggressive ground

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack. *Inaccessible Areas:* *Examination of representative samples of below-grade concrete, when excavated for any reason, is to be performed, if the below-grade environment is aggressive (pH<5.5, chlorides>500ppm, or sulphates>1,500 ppm).* *Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is aggressive or non-aggressive.* NEI recommended the Further Evaluation be changed as follows: Yes, if environment is aggressive		water/soil; i.e. pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and (2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations. For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant-specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation The staff agreed with this change because a plant-specific AMP is called out, and further evaluation is recommended. The GALL Report was revised to address these proposed changes.
G.III-GC-4b	T-15 T-17	NEI recommended in the AMP column be changed as follows: *Inaccessible Areas:* *Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index > 100 day-inch/yr) (NUREG-1557). Documented evidence to*	NEI stated the text was not consistent with other sections of GALL because there was no discussion of accessible and inaccessible concrete. It is also not consistent with the NRC's requirement in ISG-3 and other sections of GALL (see also the endnotes to this	The staff did not agree with the change because, for inaccessible areas, the staff prefers to retain entrained air and water-to-cement ratio. The GALL Report was not revised to address this proposed change.

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		confirm that existing concrete has air content of 3% to 6%, and subsequent inspections did not exhibit degradation related to freeze-thaw, should be considered a part of the evaluation. The weathering index for the continental US are shown in ASTM C33-90, Fig.1. NEI recommended the Further Evaluation be changed as follows: *No.* *No, if within the scope of the applicant's "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," the FERC/US Army Corp of Engineers dam inspections and Maintenance or the Structures Monitoring Program and stated Conditions are satisfied for Inaccessible areas*	table for NEI's presentation of general comment 4).	The staff did not agree with this comment because the stated conditions are not satisfied. An evaluation is necessary and will have to be addressed in the application. However, the GALL AMP XI.S7 was modified to address NEI concern. See Appendix A, Table A.2.12.
G.III-GC-4c	T-16	NEI recommended the AMP column be changed as follows: *Inaccessible Areas:* *An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.*	NEI stated the text was not consistent with other sections of GALL because there was no discussion of accessible and inaccessible concrete. It is also not consistent with the NRC's guidance in ISG-3 and other sections of GALL (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff did not agree with the comment because the existing words provide more information and a better explanation than the words proposed by NEI. The GALL Report was not changed as a result of this comment.

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		NEI recommended the Further Evaluation be changed as follows: *No.* *No, if concrete was constructed as stated for inaccessible areas*		The staff did not agree with this comment because the AMP description (above) was not changed. The GALL Report was not revised to address these proposed changes.
G.III-GC-4d	T-03	NEI recommended that the AMP column be changed as follows: *Inaccessible Areas:* *As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77.* *Therefore, if these conditions are satisfied, aging* ***management is not necessary.*** ~~Evaluation is needed if testing and petrographic examinations of aggregates performed in accordance with ASTM C295-54, ASTM C227-50, or ACI 201.2R-77 (NUREG-1557) demonstrate that the~~	NEI proposed the change in the AMP, so it will be consistent with previous GALL version (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff agreed that the NEI proposed changes in the AMP column are acceptable because they are identical to the original wording inGALL'01. The GALL Report was revised to address these proposed changes.

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		~~aggregates are reactive.~~		
G.III.GC-5a	T-15 T-16 T-17 T-18 T-19 T-20 T-21 T-22	NEI recommended the AMP column add on another alternative program as follows: GALL AMP XI.S6 “Structures Monitoring Program”	NEI proposed that this change recognizes that the Structures Monitoring Program (SMP) is also commonly used for aging management of concrete in the water control structures (see also the endnotes to this table for NEI’s presentation of general comment 5).	The staff did not agree with the proposed change in GALL AMP XI.S6, because the U.S. Army Corps of Engineers (COE) guidelines for water-control structures are very specific. The SMP is too general. However, staff agreed to provide this option in the description for GALL AMP XI.S7, provided that necessary elements of GALL AMP XI.S7 are addressed. GALL AMP XI.S7 was revised to address this change. See Appendix A, Table A.2.12 of this report.
G.III-GC-5b	T-12	NEI recommended the AMP be changed as follows: *Note: May be part of GALL AMP XI.S6 “Structures Monitoring Program”*	NEI proposed that many plants use SMP for Masonry Wall (see also the endnotes to this table for NEI’s presentation of general comment 5).	The staff did not agree with adding GALL AMP XI.S6 SMP to the GALL AMP XI.S5. The GALL AMP specific criteria are in GALL AMP XI.S5 “Masonry Wall Program” and the existing program description in GALL AMP XI.S5 allows the use of SMP. The GALL Report was not revised to address these proposed changes.
G.III.C-1	T-21	NEI recommended the environment be changed as follows: *Air – indoor uncontrolled or air – outdoor* *Water-flowing, water - standing*	NEI proposed to add the environment for carbon steel in flowing or standing water for items such as sheet piles and gates.	The staff agreed with the proposed change in description of environment. The GALL Report was revised to address this proposed change.
G.III.C-2	T-13	NEI recommended deletion of the aging effect/mechanism and aging management program, and state “None,” “None” for both.	NEI stated the industry experience and EPRI Civil Tools indicates this aging effect is not applicable to graphite plate (lubrite).	The staff did not agree with deleting the aging effect/mechanism and aging management program. Although, lubrite bearings are characterized as maintenance free, because of the differences in installation, fineness of the

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				surfaces, and lubricant characteristics, they can be subjected to mechanical wear and fretting. Therefore, the staff recommends that they should be subjected to visual examinations to assess their condition and ensure that they will be able to perform their intended functions under normal operating and postulated seismic conditions. The GALL Report was not revised to address these proposed changes.
G.III.C-3	T-14	NEI recommended the environment be changed as follows: *Treated water or treated borated water*	NEI stated the treated water or treated borated water environment is a better description of spent fuel pool environment.	The staff agreed with the changes in the environment because treated water or treated borated water is a better description of the spent fuel pool environment. The GALL Report was revised to address this proposed change.
G.III.C-4	T-27	NEI recommended adding another aging effect to the aging effect/aging mechanism column as follows: Cracking/stress corrosion cracking *Loss of material/general corrosion* GALL AMP XI.M18, "Bolting Integrity" ***or*** *GALL AMP XI.S3, "ASME Section XI, Subsection IWF"*	NEI stated loss of material is also an applicable aging effect for this component, and IWF is also an adequate program for inspection of high strength bolting for the identified aging effects.	The staff agreed the proposed changes in adding aging effect/mechanism to the column. This is acceptable because the aging effect of cracking exists in GALL'01. A new AMR line-item TP-9 was created to address loss of material in the GALL Report to address this aging effect. The GALL Report was revised to address this first proposed change. The staff did not agree with the use of GALL AMP XI.S3 because the ASME program does not look at the shank of the bolt. The GALL Report was not revised to address this second proposed

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				change.
G.III.C-5	T-28	NEI recommended the material be changed as the follows: Steel and non-steel materials (e.g., ~~lubrite plates,~~ vibration isolators, etc.)	NEI stated the industry experience and EPRI Civil Tools indicates this aging effect is not applicable to graphite plate (lubrite).	The staff did not agree with deleting lubrite plates. Although, lubrite bearings are characterized as maintenance free, because of the differences in installation, fineness of the surfaces, and lubricant characteristics, they can be subjected to mechanical wear and fretting. Therefore, the staff recommends that they should be subjected to visual examinations to assess their condition and ensure that they will be able to perform their intended functions under normal operating and postulated seismic conditions. The GALL Report was not revised to address these proposed changes.
G.III.C-6	T-30	NEI recommended the environment be changed as the follows: Air – indoor uncontrolled (External) *or air-outdoor*	NEI stated add air-outdoor to account for components located outdoors such as platforms, instrument racks, and electrical enclosures.	The staff agreed with the proposed change because it would provide for proper aging management for components for indoor or outdoor environments. The GALL Report was revised to address these proposed changes.
G.III.C-7	TP-1	NEI recommended the deletion this AMR line-item.	NEI stated the industry experience and EPRI Civil Tools indicates this aging effect is not applicable to graphite plate (lubrite).	The staff did not agree with deleting this AMR line-item. Although, lubrite bearings are characterized as maintenance free, because of the differences in installation, fineness of the surfaces, and lubricant characteristics, they can be subjected to mechanical wear and fretting. Therefore, the staff recommends that they be subjected to visual examinations to assess their condition and ensure that they will be able to perform their intended

Table A.2.2: Disposition of NEI Comments on Chapter III of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				functions under normal operating and postulated seismic conditions. The GALL Report was not revised to address these proposed changes.
G.III.C-8	TP-5 See new item TP-11	NEI recommended the material be changed as the follows: *Galvanized steel*, Stainless steel	NEI stated this is based on a past precedent (Robinson SER NUREG 1785).	The staff agreed that the proposed changes in the material are acceptable because galvanized steel can be used in these applications, and no aging effects are expected in this indoor environment. A new AMR line-item TP-11 was created.
G.III.C-9	TP-6	NEI recommended the material and aging effect/mechanism be changed as the follows ~~Galvanized steel,~~ aluminum, stainless steel Loss of material/ ~~pitting and crevice~~ corrosion	NEI stated this is based on a past precedent (Robinson SER NUREG 1785). NEI had proposed a new AMR line-item be added for galvanized steel.	The staff did not agree with this comment because galvanized steel in an outdoor environment is subject to aging effects. Also, pitting and crevice corrosion are aging mechanisms associated with these materials in an outdoor environment. The GALL Report was not revised to address these proposed changes.
G.III.C-10	TP-8	NEI recommended the aging effect/mechanism and aging management program be changed as the follows: ~~Loss of material/ galvanic corrosion~~ *None* ~~GALL AMP XI.S6, "Structures Monitoring Program"~~ *None*	NEI stated the NUREG basis document for GALL states "Difficult to justify loss of materials in this environment. All issued SERs have accepted "no aging effects." Therefore aging effect and AMP should be changed to "None."	The staff agreed with this change because air - indoor uncontrolled environment is defined as "normally dry" in GALL Chapter IX. The GALL Report was revised to address this proposed change.

Endnotes Clarifying General Comments Provided by NEI

1. General Comment 1 (GC1): Consolidation of Chapter III Tables

The tables of Chapter III for the various structures and component supports are highly repetitive. Many of the generic GALL lines are the same for each structure table. To simplify these GALL tables, the nine structures tables have been consolidated into three tables. Tables A1, A2, A3, A4, A5, and A9 comprise a new Group 1 Structures Table; Table A6 becomes a new Group 2 Structures Table; and Tables A7 and A8 are joined to become a new Group 3 Structures Table. Similarly, the three ASME piping supports tables B1.1, B1.2 and B1.3 are combined as a table for supports for ASME piping and components and Class MC (BWR Containment Supports); and the remaining four tables have been combined as a table for other supports.
Because the consolidation changes more than just the tables themselves, the entire chapter is presented below showing how it should appear; not all deletions are marked. The bases for consolidation are not discussed for each line. Comments in addition to the consolidation maintain the convention of bold italics for additions and strikethrough for deletions and a basis for the change are provided.

2. General Comment 2 (GC2): New Line-items

Proposed new lines items are listed at the end of each table. The new lines are designated “New III.X(Y) where X is the table identifier and Y is a sequential number for new lines in that table.

3. General Comment 3 (GC3): Inappropriate AMP

The wrong AMP is designated in the AMP column of some lines. For example Item III.A1-7 for Class I (other than Containment) concrete is managed by SMP not IWL. Corrections are suggested.

4. General Comment 4 (GC4): AMP Modifications for Consistency

“Accessible Areas and Inaccessible Areas” were introduced for water control structures concrete AMP to make it consistent with rest of the GALL Report. For example see Item III.A2-3.

5. General Comment 4 (GC5): Alternate AMPs

Added ‘and/or Structures Monitoring Program (SMP).’ Section XI mentions SMP as an alternative program; we are adding it in GALL so that we can credit it as ‘consistent with GALL.’ For example see Item III.A2-3.

This Page Intentionally Left Blank

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IV-GC-1a	RP-25	Create new AMR line-item to address loss of material for Stainless Steel (SS) in a treated water environment. Specifically, add the aging effect of loss of material due to pitting and crevice corrosion for *SS, steel with nickel-alloy or stainless steel cladding; nickel-alloy Flanges, nozzles; penetrations; pressure housings; safe ends; vessel shells, heads and welds* in a *reactor coolant* environment. The NEI-recommended AMP was *GALL AMP XI.M2, "Water Chemistry," for BWR water.*	NEI suggested the addition of this AMR line-item to be consistent with new IV.A2 (1) as shown in comment G-IV-GC - 2.a. NEI recommended the water chemistry AMP as sufficient basis for minimizing the dissolved oxygen and ionic impurity concentrations and thus managing pitting and crevice corrosion (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed that the proposed line-item could be added for consistency with the additions for stainless steel components in PWR reactor coolant environment. The component "pressure housing" does not apply to BWRs. Unlike the PWR reactor coolant environment, the BWR treated water environment does not contain boron (which is a recognized corrosion inhibitor). Thus for this AMR line-item related to BWRs, it is necessary to have the GALLAMP XI.M2, "Water Chemistry," augmented by verifying the effectiveness of water chemistry control. The staff determined that the appropriate AMP description is GALL AMP XI.M2, "Water Chemistry," for BWR water. The AMP is to be augmented by verifying the effectiveness of water chemistry control. See GALL AMP XI.M32, "One-Time Inspection," for an acceptable verification program. A new AMR line-item RP-25 was created.
G-IV-GC-1b	RP-26	Create new AMR line-item to address loss of material for SS in a treated water environment. (Same as G-IV-GC-1.a but address a different component in a different RCS subsystem). Create new AMR line-item to address the aging effect of loss	NEI suggested the addition of this AMR line-item to be consistent with new AMR line-item IV.A2 (1) as shown in comment G-IV-GC - 2.a. NEI recommended the water chemistry AMP as sufficient basis for minimizing the	The staff agreed that the proposed line-item could be added for consistency with the additions for SS components in PWR reactor coolant environment. Unlike the PWR reactor coolant environment, the BWR treated water environment does not contain boron

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		of material due to pitting and crevice corrosion for *SS; steel with nickel-alloy or SS cladding; nickel-alloy Reactor vessel internals components* in a *reactor coolant* environment. The NEI-recommended AMP was *GALL AMP XI.M2, "Water Chemistry," for BWR water.*	dissolved oxygen and ionic impurity concentrations and thus managing pitting and crevice corrosion (see also the endnotes to this table for NEI's presentation of general comment 1).	(which is a recognized corrosion inhibitor). Thus for this AMR line-item related to BWRs, it is appropriate to have as the GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and GALL AMP XI.M2, "Water Chemistry," for BWR water. When GALL AMP XI.M1 is associated with water chemistry, it is not necessary to verify the effectiveness of chemistry because ISI periodically checks the effectiveness of chemistry which is better than one-time verification (GALL AMP XI.M32). A new AMR line-item RP-26 was created.
G-IV-GC-1c	RP-27	Create new AMR line-item to address loss of material for SS in a treated water environment (same as G-IV-GC-1.a but address a different component in a different RCS subsystem). Create new AMR line-item to address the aging effect of loss of material due to pitting and crevice corrosion for *Steel with stainless steel or nickel alloy cladding; SS; nickel alloy reactor coolant pressure boundary components in* a *reactor coolant* environment. The NEI-recommended AMP was *GALL*	NEI suggested the addition of this AMR line-item to be consistent with new AMR line-item IV.A2 (1) as shown in comment G-IV-GC - 2.a. NEI recommended the water chemistry AMP as sufficient basis for minimizing the dissolved oxygen and ionic impurity concentrations and thus managing pitting and crevice corrosion (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed that the proposed line-item could be added for consistency with the additions for stainless steel components in PWR reactor coolant environment. Unlike the PWR reactor coolant environment, this BWR treated water environment does not contain boron (which is a recognized corrosion inhibitor). Thus for this AMR line-item related to BWRs, it is appropriate to have as the AMP description "Chapter XI.M2, "Water Chemistry," for BWR water. The AMP is to be augmented by verifying the effectiveness

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		AMP XI.M2, "Water Chemistry," for BWR water.		of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program." A new AMR line-item RP-27 was created.
G-IV-GC-1d1.1	No corresponding AMR line-item created although proposed by NEI for IV.D1(1) IV.D2(1)	Same as G-IV-GC-1.a but address a different component in a different RCS subsystem. Create new AMR line-item to address the aging effect of loss of material due to pitting and crevice corrosion for *Steel with SS or nickel alloy cladding; SS; nickel alloy Primary side steam generator components* in a *Reactor coolant* environment. The NEI-recommended AMP was *GALL AMP XI.M2, "Water Chemistry," for PWR primary water.*	NEI suggested the addition of this AMR line-item to address the aging effect of loss of material in a treated borated water environment (PWR reactor coolant). NEI recommended the water chemistry AMP as sufficient basis for minimizing the dissolved oxygen and ionic impurity concentrations (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff did not agree with this comment. The staff decided that the proposed line-item potentially conflicted with other AMR line-items and the assigned AMP (such as R-44 which uses GALL AMP XI.M19, "Steam Generator Tubing Integrity" together with GALL AMP XI.M2, "Water Chemistry," for PWR primary water). The GALL Report was not revised to address this proposed change.
G-IV-GC-1d1.2	No corresponding AMR line-item created although proposed by NEI for IV.D1(2)	Create new AMR line-item to address the aging effect cracking due to SCC for *Steel with SS or nickel alloy cladding; SS; nickel alloy tubesheet* in a *Reactor coolant* environment. The NEI-recommended AMP was *GALL AMP XI.M2, "Water Chemistry," for PWR primary water.*	NEI wrote that their proposed AMR line-item addresses the primary side of the tubesheet and added that this AMR line-item is similar to RP-17 with added materials (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff did not agree with this comment because of concern that the proposed AMP may not adequately manage cracking due to SCC in the additional nickel alloy materials in a reactor coolant environment. RP-17 uses GALL AMP XI.M2, "Water Chemistry," for PWR primary water. The GALL Report was not revised to address this proposed change.
G-IV-GC-1d1.3	No corresponding AMR line-item created	Create new AMR line-item to address the aging effect cracking due to SCC for *Steel with SS or nickel alloy*	NEI wrote that their proposed AMR line-item addresses the secondary side of the tubesheet and that the AMR line-item is	The staff did not agree with this comment. The staff decided that the proposed AMR line-item is not needed because it is not anticipated that SCC of

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	although proposed by NEI for IV.D1(3)	*cladding; SS; nickel alloy tubesheet in* a *Secondary feedwater/ steam* environment. The NEI-recommended AMP was *GALL AMP XI.M2, "Water Chemistry," for PWR secondary water, and Plant-specific inspection program.*	similar to lines RP-14 and R-36 except that a plant-specific inspection program is used since neither ISI nor SG Tube Integrity is applicable (see also the endnotes to this table for NEI's presentation of general comment 1).	the tubesheet on the secondary side is a significant enough issue to warrant inclusion. The GALL Report is not intended as a scoping and screening document. If the AMR line-item were to be added, the appropriate AMP would have to be 'plant-specific.' NEI's analogy of AMR line-item RP-14 addresses SCC of Ni or SS antivibration bars in a secondary feedwater/ steam environment and references ISI and SGTI AMPs. NEI's analogy of AMR line-item R-36 addresses SCC of Ni SG components in a secondary feedwater/ steam environment and also references ISI and SGTI AMPs. The GALL Report was not revised to address this proposed change.
G-IV-GC-1d1.4	No corresponding AMR line-item created although proposed by NEI for IV.D1(4) I V.D2(2)	Create new AMR line-item to address the aging effect of loss of material due to pitting and crevice corrosion for *Steel with SS or nickel alloy cladding; SS; nickel alloy Steam generator components* in a *Secondary feedwater/ steam* environment. The NEI-recommended AMP was *GALL AMP XI.M2, "Water Chemistry," for PWR secondary water, and Plant-specific inspection program.*	NEI wrote that this proposed AMR line-item addresses SS and nickel alloy secondary side components and that the line-item is similar to lines SP-16 and S-22 except that a plant-specific inspection program is used and nickel alloy is included (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff did not agree with this comment. The staff decided that the proposed line-item was too broad and potentially conflicted with other AMR line-items such as those discussing SG tubes. The GALL Report was not revised to address this proposed change.
G-IV-GC-1e	No corresponding AMR line-item	Create new AMR line-item to address the situation where there is no aging effect found	NEI wrote that this proposed AMR line-item was based on the proposed revision to add	The staff did not agree with the NEI proposed AMR line-item because the staff disagrees that the containment

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	created although proposed by NEI for IV.E(1)	(and no recommended AMP) for external *surfaces* of *steel piping, piping components, and piping elements exposed* to *inert containment environment.*	the definition of an inert containment environment to GALL Chapter IX (see also the endnotes to this table for NEI's presentation of general comment 1).	environment is inert (it is subjected to outages and moisture leakages). The GALL Report was not revised to address this proposed change.
G-IV-GC-2a	RP-28	Create new AMR line-item to address loss of material in a treated borated water environment due to pitting and crevice corrosion for *SS; steel with nickel-alloy or SS cladding; nickel-alloy flanges, nozzles; penetrations; pressure housings; safe ends; vessel shells, heads and welds* in a *reactor coolant* environment. The water chemistry AMP XI.M2 is the basis for minimizing the dissolved oxygen and ionic impurity concentrations.	Pitting and crevice corrosion may occur in ASME Code Class1 SS or NiCrFe components under exposure to aggressive, oxidizing environments (quoted from Farley SER Section 3.1.2.3.1.2, and applicant's response to RAI 3.1.3.1.1-1). Because the aging effect is minor, the water chemistry program by itself is sufficient to manage this aging effect, as evidenced by past operating experience (see also the endnotes to this table for NEI's presentation of general comment 2).	The staff agreed with this comment. In the context of the PWR borated water environment, loss of material due to pitting and crevice corrosion is effectively managed by recommendations in GALL AMP XI.M2, *"Water Chemistry," for PWR primary water.* The inclusion of boron (even at 25 ppm levels) acts as a corrosion inhibitor to protect stainless steels in a demineralized water environment (Nalco Water Handbook, 2nd Edition). Thus it is not necessary to have additional augmentation for the GALL AMP XI.M2, as it would be if this AMR line-item addressed BWR components (exposed to a nonborated water environment). A new AMR line-item RP-28 was created.
G-IV-GC-2b	RP-24	Create new AMR line-items to address the aging effect of loss of material for stainless steel or nickel alloy reactor vessel internals components in a treated PWR borated water environment. (Reactor coolant). The water chemistry GALL AMP	Pitting and crevice corrosion may occur in ASME Code Class1 stainless steel or NiCrFe components under exposure to aggressive, oxidizing environments. Because the aging effect is minor, the water chemistry	The staff agreed with this comment. In the context of the PWR borated water environment, loss of material due to pitting and crevice corrosion is effectively managed by recommendations in GALL AMP XI.M2, *"Water Chemistry," for PWR primary water.*

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		XI.M2 is the basis for minimizing the dissolved oxygen and ionic impurity concentrations.	program by itself is sufficient to manage this aging effect, as evidenced by past operating experience (precedent based on Farley SER Section 3.1.2.3.1.2, and applicant's response to RAI 3.1.3.1.1-1) (see also the endnotes to this table for NEI's presentation of general comment 2).	Consistent revisions were made to tables for PWR reactor vessel internals for Westinghouse, Combustion Engineering, & Babcock & Wilcox. The inclusion of boron (even at 25 ppm levels) acts as a corrosion inhibitor to protect stainless steels in a demineralized water environment (Nalco Water Handbook, 2nd Edition). Thus it is not necessary to have additional augmentation for the GALL XI.M2 AMP, as it would be if this AMR line-item addressed BWR components (exposed to a nonborated water environment). A new AMR line-item RP-24 was created.
G-IV-GC-2c	RP-23	Create new AMR line-item to address the aging effect of loss of material due to pitting and crevice corrosion for *Steel with stainless steel or nickel alloy cladding; stainless steel; nickel alloy* *Piping, piping components, and piping elements; flanges; heater sheaths and sleeves; penetrations; thermal sleeves; vessel shell heads and welds* in a treated PWR borated water environment (reactor coolant). The water chemistry GALL AMP XI.M2 is the basis for minimizing the dissolved oxygen and ionic impurity concentrations.	Pitting and crevice corrosion may occur in ASME Code Class1 stainless steel or NiCrFe components under exposure to aggressive, oxidizing environments. Because the aging effect is minor, the water chemistry program by itself is sufficient to manage this aging effect, as evidenced by past operating experience (precedent based on Farley SER Section 3.1.2.3.1.2, and applicant's response to RAI 3.1.3.1.1-1) (see also the endnotes to this table for NEI's presentation of general comment 2).	The staff agreed with this comment. In the context of the PWR borated water environment, loss of material due to pitting and crevice corrosion is effectively managed by recommendations in GALL AMP XI.M2, *"Water Chemistry," for PWR primary water.* Consistent revisions were made to tables for PWR reactor vessel internals for Westinghouse, Combustion Engineering, & Babcock & Wilcox. The inclusion of boron (even at 25 ppm levels) acts as a corrosion inhibitor to protect stainless steels in a demineralized water environment (Nalco Water Handbook, 2nd Edition). Thus it is not necessary to have additional augmentation for GALL AMP XI.M2, as it

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		Delete following sentence in GALL Report '05 introduction to Chapter IV C2 "The effects of pitting and crevice corrosion on stainless steel components are not significant in treated borated water and, therefore, are not included in this section."		would be if this AMR line-item addressed BWR components (exposed to a nonborated water environment). The introductory sentence in the narrative for IV.C2 was removed. A new AMR line-item RP-23 was created.
G-IV-GC-3a	Global change	Wherever it is used in AMR line-items within the AMP column to describe GALL AMP XI.M2 for PWR water chemistry, delete the reference to the specific EPRI document TR105714.	The reference to the specific EPRI document need not be included in the AMP column of this particular AMR line-item because this information is provided in GALL AMP XI.M2. Within the AMR line-item, it is adequate and internally consistent to more simply reference GALL AMP XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714 as GALL AMP XI.M2, "Water Chemistry," for PWR primary water" (see also the endnotes to this table for NEI's presentation of general comment 3).	The staff agreed with this comment. In the circumstances where previously EPRI TR-105714 was referenced in the AMP column of the AMR line-item, the AMP XI.M2 is now denoted as GALL AMP XI.M2, "Water Chemistry," for PWR primary water." The GALL Report was revised to address this proposed change.
G-IV-GC-3b	Global change	Wherever it is used in AMR line-items within the AMP column to describe AMP XI.M2 for BWR water chemistry, delete the reference to BWRVIP-29 (EPRI TR-103515)	The reference to the specific EPRI document need not be included in the AMP column of this particular AMR line-item because this information is provided in GALL AMP XI.M2. Within the AMR line-item, it is adequate and internally consistent to more simply reference GALL AMP XI.M2,	The staff agreed with this comment. In the circumstances where previously BWRVIP-29 (EPRI TR-103515) was referenced in the AMP column of the AMR line-item, the AMP XI.M2 is now denoted as GALL AMP-XI.M2, "Water Chemistry," for BWR water. The GALL Report was revised to address this proposed change.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			"Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515) as GALL AMP XI.M2, "Water Chemistry," for BWR water" (see also the endnotes to this table for NEI's presentation of general comment 3).	
G-IV-GC-3c	Global change	Wherever it is used in AMR line-items within the AMP column to describe GALL AMP XI.M2 for PWR secondary water chemistry, delete the reference to EPRI TR-102134.	The reference to the specific EPRI document need not be included in the AMP column of this particular AMR line-item because this information is provided in GALL AMP XI.M2 Within the AMR line-item, it is adequate and internally consistent to more simply reference GALL AMP XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134 as GALL AMP XI.M2, "Water Chemistry," for PWR secondary water" (see also the endnotes to this table for NEI's presentation of general comment 3).	The staff agreed with this comment. In the circumstances where previously EPRI TR-102134 was referenced in the AMP column of the AMR line-item, the AMP XI.M2 is now denoted as GALL AMP XI.M2, "Water Chemistry," for PWR secondary water. The GALL Report was revised to address this proposed change.
G-IV-GC-4	R-01 R-06 R-75 R-76 R-89 R-90 RP-21 RP-22	Where appropriate, replace term "Alloy 600" in the AMP column for these AMR line-items describing the appropriate AMP with "nickel alloys."	Aging issues associated with Alloy 600 also affect other nickel alloys such as Alloy 690/52/152. The guidance for AMP should be applicable to nickel alloys (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff agreed with this comment. The specificity created by denoting Alloy 600 in the AMP description within the AMR line-item is not desirable when considering the aging issues of nickel alloys. The GALL Report was revised to address this proposed change.
G-IV-GC-5	R-01	Add Nickel (Ni) alloys to	Materials for certain items may	The staff partially agreed with this

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	R-126 R-128 R-130 R-131 RP-21	materials for certain items in addition to stainless steel (SS).	include Ni alloys in addition to SS. Similarly, some items currently listed as nickel alloy can also be steel clad with nickel alloy, e.g., SG primary side components. The added materials are subject to the same aging effects as those currently listed (see also the endnotes to this table for NEI's presentation of general comment 5).	comment. *Steel with nickel alloy cladding* was added to already existing Ni alloy in R-01 and RP-21. *Nickel alloy* was added to already existing stainless steel in R-130 and R-131. *Nickel alloy* was not added to R-126 and R-128. The GALL Report was revised to address this proposed change.
G-IV-GC-6a	R-12 R-27 R-73 GIX Table IX.C	Group the term "high strength low alloy steel" within the category of low alloy steel.	NEI pointed out that the "High strength" modifier refers to susceptibility to the cracking aging effect and that bolt strength does not impact the fatigue or wear aging mechanisms (see also the endnotes to this table for NEI's presentation of general comment 6).	The staff agreed with this comment. The staff agreed that since the high strength steels are vulnerable to SCC, this descriptor should be retained where cracking is stipulated as the aging mechanism and simplified to low-alloy steel where SCC was not among the aging mechanisms. The staff agreed to remove any reference to specific maximum tensile strength in the material column. As stated in NUREG-1339, pg. 12, "high-strength bolts should be those with yield strength, S_y, ≥ 150 ksi" and GALL Chapter IX was modified to include the clarification. As shown in the second column for AMR line-items, a number of AMR line-item material designations were changed in response to this comment. These are the ones that do not reference cracking as an aging effect.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				The GALL Report was revised to address this proposed change.
G-IV-GC-6b	R-11 R-60 R-71 GIX Table IX.C	Group the term "high strength low alloy steel" within the category of low alloy steel.	NEI pointed out that the "High strength" modifier refers to susceptibility to the cracking aging effect and that bolt strength does not impact the fatigue or wear aging mechanisms (see also the endnotes to this table for NEI's presentation of general comment 6).	The staff agreed with this comment. The staff agreed that since the high strength steels are vulnerable to SCC, this descriptor should be retained where cracking is stipulated as the aging effect and simplified to low-alloy steel where SCC was not among the aging mechanisms. As stated in NUREG-1339, pg. 12, "high-strength bolts should be those with yield strength, S_y, ≥ 150 ksi" and GALL IX was modified to include the clarification. As shown in the second column for AMR line-items, a number of AMR line-item material designations were not changed in response to this comment. These are the ones that reference cracking as an aging effect. The GALL Report was modified to address this comment.
G-IV-GC-6c	R-12 R -27 R-32	Delete loss of preload due to stress relaxation as an aging effect/aging mechanism couplet in GALL.	NEI stated that the industry does not consider loss of preload as an aging effect requiring management. Loss of preload is a design driven effect and not an aging effect requiring management (EPRI 1003056, "Mechanical Tool," Appendix F) NEI further wrote that the bolting at most facilities is standard grade B7 carbon steel, or similar material, except	The staff agreed with the proposed change with modification. The staff agreed that ASME Code Section II Part D Table 4 Note G14 points out that loss of preload due to stress relaxation (creep) for B7 (low alloy steel –A193 B7, as stated in Appendix F of EPRI 1003056 and elsewhere) can only be a concern in very high temperature applications(> 700°F). The reference (EPRI TR-104213)

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			in rare specialized applications. Loss of preload due to stress relaxation (creep) for this material can only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code Section II Part D Table 4 Note 4 (see also the endnotes to this table for NEI's presentation of general comment 6).	replaces the earlier report EPRI NP-5067, *Good Bolting Practices, A Reference Manual for Nuclear Power Plant Maintenance Personnel.* In both documents, loss of preload due to gasket creep, thermal effects (including differential expansion and creep or stress relaxation), and self-loosening (which includes vibration, joint flexing, cyclic shear loads, thermal cycles) is discussed. The staff determined that this combination of aging mechanisms will replace 'stress relaxation.' Thus the replacement aging effect/aging mechanism will be loss of preload/ thermal effects, gasket creep, and self-loosening. The GALL Report was revised to address this comment.
G-IV-GC-7a	R-04 R-09 R-100 R-109 R-110 R-138 R-139 R-149 R-151 R-159 R-160 R-166 R-167 R-168 R-180 R-182	Cast austenitic stainless steel (CASS) should be treated as a subset of stainless steel EXCEPT where CASS and SS have different aging effects/mechanisms (loss of fracture toughness due to thermal and neutron irradiation embrittlement). List CASS as a separate material only when loss of fracture toughness is an issue.	With the exception of the loss of fracture toughness due to thermal and neutron irradiation embrittlement, CASS and stainless steel share the same aging effects/mechanisms in GALL (see also the endnotes to this table for NEI's presentation of general comment 7).	The staff agreed with this comment. CASS is generally treated as a subset of stainless steel EXCEPT where CASS and SS have different aging effects/mechanisms. Both CASS and SS are subject to • cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking, and or intergranular stress corrosion cracking, • cracking/ primary water stress corrosion cracking, • changes in dimensions/void swelling, and • cumulative fatigue damage/ fatigue.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	R-185 R-20 R-202 R-204 R-24 R-53 R-54 R-76 R-83 GIX Table IX.C			These aging effect/aging mechanisms are generally managed by the same AMPs for both CASS and SS. AMR line-items and the definition of stainless steel in Chapter IX are changed accordingly. As indicated by the AMR line-item numbers, CASS was removed from the materials listing and stainless steel was added if not already present. Others, such as IV.C2-4 (R-05), retained their original identity. The GALL Report was revised to address this proposed change.
G-IV-GC-7b	RP-02	Delete AMR line-items where CASS is not subjected to aging effect/aging mechanism couplet of loss of fracture toughness due to thermal and/or neutron irradiation embrittlement.	CASS is treated as a subset of stainless steel EXCEPT where CASS and SS have different aging effects/mechanisms (loss of fracture toughness due to thermal and neutron irradiation embrittlement) (see also the endnotes to this table for NEI's presentation of general comment 7).	The staff agreed with this comment. As shown in the staff disposition for comment G-IV-GC-7a, CASS is treated as a subset of SS except where the aging effect of fracture toughness is due to thermal and neutron irradiation embrittlement. The GALL Report was revised to address this proposed change.
G-IV-GC-8a1	R-04	The composite component description is confusing when it includes both generic description as well as specific component names. Component combination ~~Piping, piping components, and piping elements;~~ *F*langes; *nozzles;* ~~heater sheaths and~~	NEI pointed out that the composite component description is confusing when it includes both generic descriptions as well as specific component names (see also the endnotes to this table for NEI's presentation of general comment 8).	The staff agreed with this comment. The staff decided it was appropriate to split R-04 into 6 generic items. • R-04 which includes (for BWRs) the IV.A1 links and the components defined as, BWR vessel components - Flanges; nozzles; penetrations; safe ends; thermal sleeves, vessel shells, heads and welds.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		~~sleeves~~; penetrations; ~~pressure housings; pump casing/cover; spray head~~; ~~thermal sleeves~~; *safe ends;* vessel shells, heads and welds Or Piping, piping components, and piping elements~~; flanges; heater sheaths and sleeves; penetrations; pressure housings; pump casing/cover; spray head; thermal sleeves; vessel shell heads and welds~~ (with GIX definition updated to include penetrations, pressure housings, vessel shells heads and welds.)		• R-219 which includes (for PWRs) the IV.A2 links and the PWR Reactor vessel components defined as Flanges, *nozzles;* penetrations; pressure housings; *safe ends,* Thermal sleeves, vessel shells, heads and welds. • R-220 which includes (for BWRs) the IV.C1 links and the components defined as Piping, piping components, and piping elements. • R-223 which includes (for PWRs) the IV.C2 links and the components defined as Piping, piping components, and piping elements; flanges; Nozzles and safe ends; Pressurizer vessel shell heads and welds; Heater sheaths and sleeves; Penetrations; and Thermal sleeves • R-221 which includes IV.D1 link and the components defined as Recirculating steam generator components: Flanges; Penetrations; Nozzles; Safe ends, lower heads and welds. • R-222 which includes IV.D2 link and the components defined as Once-through steam generator components: Primary side nozzles; Safe ends and welds.
G-IV-GC-8d1	R-33	Replace components definition term of “steam generator components” with more specific	The term “Steam generator components” is too broad a ‘Structure and/or Component’	The staff agreed with this comment. The staff decided it was appropriate to keep the recirculating and once-through SGs

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		identification.	identification for this item. Item IV.D1-5 addresses the same aging effect for primary side steam generator components. Rev. 0 structure/component description of GALL'01 was adequate. Comment also applies to item IV.D2-9 below (see also the endnotes to this table for NEI's presentation of general comment 8).	together in this case and the listing of SSCs was changed to Steam generator components Top head Steam nozzle and safe end; Upper and lower shell; FW and AFW nozzle and safe end; FW impingement plate and support. The GALL Report was revised to address this proposed change.
G-IV-GC-8d1	R-07	The composite component description is confusing when it includes both generic description as well as specific component names. Change the components to delete Class 1 piping, fittings and only retain primary nozzles, safe ends, manways, and flanges. Alternatively, identify which Class 1 pipe and fittings are this item referring to that is not already addressed in Section IV.C2. Clarify components for which this item is applicable.	The draft NUREG-1833 bases document) does not address this change in approach for listing component names. Manways and flanges are reasonable additions for recirculating steam generators due to being primary side forgings, but Class 1 piping and fittings create confusion since piping and fittings are addressed in Section IV.C2 (see also the endnotes to this table for NEI's presentation of general comment 8).	The staff did not agree with this comment. The staff decided to keep Class 1 piping and fittings. The AMR line-item R-07 is used for the link to the piping and fittings in IV C2 as well as D1 and references the following GALL'01 line-items: C2.2-f C2.5-h C2.5-m D1.1-i The GALL Report was not revised to address this proposed change.
G-IV-GC-8d2	R-35	Replace the term "Steam generator components" with more specific identification.	The term "steam generator components" is too broad a 'Structure and/or Component' identification for this item (see also the endnotes to this table for NEI's presentation of general comment 8).	The staff agreed with this comment. The staff redefined the S&C term as: Primary side components Upper and lower heads Tube sheets and tube-to-tube sheet welds The GALL Report was revised to

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				address this proposed change.
G-IV-GC-8d3	R-34	Refine the SG components definition term. Clarify the description of the AMP in the AMR line-item.	NEI stated that the existing AMP description in the AMR line-item does not clearly convey the nature of the degradation mechanism, which is related to a very specific set of conditions, not to most SGs. IN 90-04 indicates that pitting corrosion on the surface served as corrosion fatigue crack initiation sites, not that pitting corrosion resulted in sufficient degradation to cause loss of component function. Further, this degradation mode has been limited to isolated cases of weld-zone cracking in Westinghouse Model 44 and 51 SGs, where a high stress region exists in the area of the shell to transition cone weld (see also the endnotes to this table for NEI's presentation of general comment 8).	The staff agreed with this comment. The staff determined it was necessary to separate the AMR line-item for the recirculating SG [D1.1-c] from the AMR line-item for the once-through SG [D2.1-e] which becomes R-224 and is discussed below in G-IV-GC-8d4. The staff redefined the S&C term for R-34 as, "Steam generator components, Upper and lower shell, and transition cone." The reference in the AMR line-item to the AMP column is rewritten to state " Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 2 components and Chapter XI.M2, "Water Chemistry," for PWR secondary water. As noted in NRC Information Notice IN 90-04, *if* general and pitting corrosion of the shell *is known to* exist~~s~~, the guidelines in XI.M1 may not be sufficient to detect general and pitting corrosion *(and the resulting corrosion-fatigue cracking)*, and additional inspection procedures are to be developed. *This issue is limited to Westinghouse Model 44 and 51 Steam Generators where a high stress region exists at the shell to transition cone weld.* The GALL Report was revised to address this proposed change.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IV-GC-8d4	R-224	As shown in companion comment for R-34, refine SG components definition term. Clarify the reference to the AMP in the AMR line-item	NEI stated that the existing reference to the AMP in the AMR line-item does not clearly convey the nature of the degradation mechanism, which is related to a very specific set of conditions, not to most SGs. See companion comment for IV D1-16 (see also the endnotes to this table for NEI's presentation of general comment 8).	The staff agreed with this comment. The staff determined it was necessary to separate the AMR line-item for the recirculating SG [D1.1-c] from the AMR line-item for the once-through SG [D2.1-e] and a new AMR line-item R-224 was created. The S&C are defined as Steam generator components: Shell assembly The reference to the AMP column is rewritten to be, "Chapter XI.M2, "Water Chemistry," for PWR secondary water. The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program." Further Evaluation: Yes, detection of aging effects is to be evaluated. The GALL Report was revised to address this proposed change
G-IV-GC-9a	R-75 R-90	NEI commented that the 4 different types of commitment statements used in lieu of specific AMPs are less well-defined than the AMPS they replaced. For the first type, NEI commented that the replacement of a specifically defined AMP (referring to GALL AMP XI.M11 for Ni-alloy Nozzles and Penetrations) with the following open-ended	NRC staff notes that this commitment was used 15 times in the Jan'05 version of the GALL Report and replaces twice in Chpt. IV where AMP XI.M11 was originally used in GALL'01 (A2.2-a and A2.7-b) and the 3 times where there had previously been plant-specific AMPs. This commitment was also used in 2 new AMR line-items. The	The staff agreed with this comment. As mentioned in the basis for comment, The staff agreed that the interim staff guidance (ISG) process will be used to update GALL AMP XI.M11 which will again be explicitly mentioned in the AMR line-items. The staff points out that this AMP was only referenced twice in Chapter IV of GALL'01; the affected AMR line-item numbers in the 2nd column will again reference GALL AMP XI.M11A.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		commitment reduced clarity. GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and GALL AMP XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	remaining 8 usages were just an expansion on the earlier GALL'01 usage of combined. XI.M1 and XI.M2, The former plant-specific and GALL AMP XI.M11 references were changed to explicitly call out GALL AMPs XI.M1 and XI.M2, supplemented by the actions identified by Orders, Bulletins and Generic Letters associated with recent experience with nickel alloys to provide more precise guidance on what would constitute an acceptable plant-specific AMP. The staff position encompasses ISGs and branch technical positions published in other regulatory guidance documents (see also the endnotes to this table for NEI's presentation of general comment 9).	The other 13 AMR line-items using this description were changed as follows on the basis of comments G-IV-GC-3a and G-IV-GC-4: Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for PWR primary water-for *Nickel Alloys*, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines." The AMR line-items R-75 and R-90 reference the new GALL AMP XI.M11A as follows: "Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for PWR primary water and Chapter XI.M11-A, "Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized." Water Reactors (PWRs Only)" The GALL Report was revised to address this comment.
G-IV-GC-9b	R-24 R-88	NEI commented that the 4 different types of commitment statements used in lieu of	NEI was not clear whether or not a plant-specific program was required only if there are	The staff agreed with this comment. The reference to the AMP in A2.6-a (R-88) was rewritten as:

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		specific AMPs are less well-defined than the AMPS they replaced. For the second type, NEI commented that the AMP is not clear as written below: GALL AMP XI.M2, “Water Chemistry,” and GALL AMP XI.M32 “One-Time Inspection” or GALL AMP XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” and provide a commitment in the FSAR supplement to submit a plant-specific AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces.	applicable Generic Communications. The staff noted that this commitment was used 2 times in the Jan’05 version of the GALL Report where there had previously been plant-specific AMPs. This AMP was changed from requiring a plant-specific program to call out explicitly GALL AMPs XI.M2 and XI.M32 or GALL AMP XI.M1. It also allows submittal of a plant-specific AMP which would identify commitments to actions identified by Orders, Bulletins and Generic Letters associated with recent experience with nickel alloys (see also the endnotes to this table for NEI’s presentation of general comment 9).	GALL AMP XI.M2, “Water Chemistry,” and GALL AMP XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” and provide a commitment in the FSAR supplement to submit a plant-specific AMP to implement applicable (1) NRC Orders, Bulletins, and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines. Since the ISI programs do not inspect the pressurizer spray head in AMR line-item C2.5-j (R-24), the AMP is rewritten as: “GALL AMP XI.M2, “Water Chemistry,” and GALL AMP XI.M32 “One-Time Inspection” and for nickel alloy welded spray heads provide a commitment in the FSAR supplement to submit a plant-specific AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces. Further Evaluation “No, but licensee commitment needs to be confirmed.” The GALL Report was revised to address this proposed change.
G-IV-GC-9c	R-107 R-108 R-110 R-113 R-114 R-117	NEI commented that the 4 different types of commitment statements used in lieu of	The staff points out the following wording was used 58 times in the Jan’05 GALL	The staff did not agree with this comment. The existing GALL AMP XI.M16, “PWR Vessel Internals” was

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	R-119 R-121 R-122 R-124 R-125 R-126 R-127 R-128 R-129 R-131 R-132 R-134 R-135 R-136 R-137 R-139 R-141 R-144 R-147 R-151 R-154 R-157 R-158 R-160 R-161 R-163 R-164 R-165 R-168 R-169 R-174 R-177 R-178 R-182 R-184 R-187 R-188 R-192 R-195 R-196 R-197 R-199 R-200 R-201 R-204 R-205 R-207 R-211 R-212 R-213 R-215 R-216	specific AMPs are less well-defined than the AMPS they replaced. For the third type, NEI commented that the GALL AMP XI.M16, "PWR Vessel Internals" was replaced by unclear wording. NEI asked for clarification, stating that the reason for the change is unclear and the proposed commitment is also unclear. NEI asked what is the intent of submittal 24 months prior to the period of extended operation (POEO). NEI asked if submittal 24 months before any proposed inspection be an acceptable reword.	Report to rewrite 15 of the AMR line-items in GALL'01 that referenced GALL AMP XI.M16 (out of 49 total); it was used to rewrite 11 AMR line-items that referenced GALL AMP XI.M14 and it was used to more tightly focus 32 previously plant-specific AMPs. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval (see also the endnotes to this table for NEI's presentation of general comment 9).	deleted in the Jan'05 GALL Report. There is now an industry program that will define it. The staff has determined that the inspection is to be performed prior to the period of extended operation. The GALL Report was not revised to address this proposed change. The NUREG -1833 was revised to explain better the staff's rationale and changes for the listed AMR line-items.
G-IV-GC-9d	R-41	1) Change the components to read: "Steam generator structural Tube support lattice bars."	The wording in the AMP column in the AMR line-item was changed from plant-specific to reflect the industry efforts to	The staff agreed with this comment. The staff revised the component listing to state: "Steam generator structural

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		2) Explain why the original GALL'01 reference in the AMR line-item to a plant-specific AMP was changed to something that seems more unclear in what is to be done.	develop a program on inspection criteria which will be used on a plant-specific basis with NRC review and approval (see also the endnotes to this table for NEI's presentation of general comment 9).	tube support lattice bars" The wording of the AMP column in the AMR line-item is modified to read: GALL AMP XI.M19, "Steam Generator Tubing Integrity" and GALL AMP XI.M2, "Water Chemistry," for PWR secondary water The GALL Report was revised to address this comment.
G-IV-S.C.-01	R-185 R-187 R-188 R-189 GIX Table IXC	Grouping of metals. PH stainless steel forging should be subsumed by the definition of "stainless steel."	Precipitation-hardened (PH) stainless steel is a subset of stainless steel with respect to aging. There is nothing distinct in the AMR line-items associated with this material that warrants special treatment.	The staff agreed with this comment. Precipitation-hardened (PH) stainless steel (SS) is treated as a subset of stainless steel in these particular cases where the aging effect/aging mechanism (AE/M) and management are the same. For R-185, the materials listed in the Jan'05 GALL Report as "Stainless steel, PH stainless steel forging, CASS" are restated as "stainless steel." The AE/M remains cracking due to SCC, IASCC. For R-187, the materials listed in the Jan '05 GALL Report as "Stainless steel, nickel alloy, PH Stainless Steel forging" are restated as "Stainless steel; nickel alloy." The AE/M remains "Changes in dimensions/void swelling." For R-188, the materials listed in the Jan '05 GALL Report as "Stainless steel nickel alloy, PH Stainless Steel forging are restated as "Stainless steel; nickel alloy." The AE/M remains "Loss of fracture toughness/neutron irradiation embrittlement, void swelling."

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				For R-189, the materials listed in the Jan'05 GALL Report as "Stainless steel, cast austenitic stainless steel, nickel alloy, PH Stainless Steel forging" are restated as "Stainless steel; nickel alloy." (Part of R-53) the AE/M remains "Cumulative fatigue damage/ fatigue." The AMR line-item R-189 is deleted. The GALL Report was revised to address this proposed change.
G-IV-S.C.-02	R-29 GIX Table IXD	Clarification of environment. Make the following correction ~~Air with metal~~ *System* temperature up to 288°C (550°F)	Environment should be "System temperature up to 288°C (550°F)." As defined in Chapter IX, specified environment is synonymous with the suggested revision but intended to describe the environment experienced by a PWR Pressurizer support skirt.	The staff agreed with this comment. The environment for the pump and valve seal flange closure bolting should be described by the expression 'System temperature up to 288°C (550°F).' This is now used consistently through GALL Chapter IV to describe an environment for bolting or the PWR Pressurizer support skirt. The GALL Report was revised to address this proposed change.
G-IV-S.C.-03a	R-61 R-74 GIX Table IXD	Clarification of environment. Use the following expression "Air with reactor coolant leakage *(Internal).*"	GALL Chapter IX defines this environment as leakage onto a surface, which implies an external surface, and germane to BWRs. Of the 13 GIV items that list this environment, 10 items are for effects on bolting. This item addresses the collection of reactor coolant leakage inside the component (e.g., extending pressure boundary).	The staff agreed with this comment. The term "Air with reactor coolant leakage *(Internal)"* is used in these AMR line-items to address the collection of reactor coolant leakage inside the component (e.g., extending pressure boundary). The GALL Report was revised to address this proposed change.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IV-S.C.-03b	RP-13 GIX Table IXD	Clarify structural and environment parameters. Use the following expression "Air with reactor coolant leakage *(Internal) or "reactor coolant"*	Section 3.1.2.4.5 of the VCSNS SER more correctly describes the environment for this item (NEI notes that the 1/05 drafts of the Bases document lists an incorrect section of the RNP SER for the change from Rev. 0 to this item).	The staff agreed with this comment. The staff decided that the appropriate environment is "reactor coolant." The S&C term was also changed to read: "Bottom-mounted guide tube." The GALL Report was revised to address this comment.
G-IV-S.C.-04	R-145	Replace lengthy AMP description with reference to new AMP *Flux Thimble Tube Inspection Program"* supplied by NEI. NEI proposed to add this AMP.	Replace existing AMP discussion with reference to new AMP proposed for flux thimble tube inspections. Flux thimble tubes are not within the scope of ASME Section XI. Flux thimble tubes are less than 1" in diameter. Per sections IWB-1220(b), IWC-1222(a) (1), and IWD-1220(a), the flux thimble tubes are exempt from Section XI examination recommendations. Furthermore, IEB 88-09 stated, "There are currently no inservice inspection or testing requirements for thimble tubes." IEB 88-09 does not include any guidelines concerning an inspection schedule beyond the initial inspections which were performed fifteen years ago at each utility. What IEB 88-09 says about schedule is already addressed in part (b) of the AMP description.	The staff agreed with this comment. The staff reviewed, revised, and accepted the AMP XI.M37 "*Flux Thimble Tube Inspection Program."* The GALL Report was revised to address this comment.
G-IV-S.C.-	R-54	Delete AMR line-item IV.B4-38	The difference between line-	The staff agreed with this comment. The

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
05		(R-189). Combine link to GALL'01 GALL IV.B4.4-e in AMR line-item IV.B4-37 (R-54).	items IV.B4-37 and IV.B4-38 include: "PH Stainless Steel forging" is listed as an additional material in line-item IV.B4-38, whereas both list SS, CASS, and nickel alloy. IV.B4-38 is the only RV Internals (IV.B1, B2, B3, and B4) item which includes environmental effects in the AMP discussion.	AMR line-item IV.B4-38 (R-189) is subsumed by IV.B4-37 (R-54) with a link placed to GALL'01 IV.B4.4-e. The GALL Report was revised to address this proposed change.
G-IV-S.C.-06a	R-03 R-55 SRP3.1.2.2.4.1	Revise existing line-item IV.C1-1 AMP reference to be consistent with reference to AMP in line-item IV.C1-2. Rewrite GALL AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and GALL AMP XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515). Inspection in accordance with ASME Section XI does not require volumetric examination of pipes less than NPS 4. A plant-specific destructive examination or a nondestructive examination that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended	As presently listed, GALL specifies a plant-specific destructive or non-destructive examination for SCC and a separate plant-specific inspection (One-time Inspection is acceptable) for cracking of the same components due to thermal and mechanical loading.	The staff agreed with this comment. The staff decided to combine AMR Line-items R-03 and R-55 (as had been previously in GALL'01 IV C1-1. The new AMR line-item R-03 (R-55 deleted from use) has changes in 2 columns– AE/M becomes Cracking/stress corrosion cracking, intergranular stress corrosion cracking (for stainless steel only), and thermal and mechanical loading. The entry in the AMP column is rewritten as: Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, and Chapter XI.M2, "Water Chemistry," for BWR water and XI.M35, "One-Time Inspection of ASME Code Class 1 Small-bore Piping." The GALL Report was revised to address this proposed change.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		period of operation.		
G-IV-S.C.-06b	R-02	Revise existing IV.C2-1 (R-02) to reinstate AMP description to be consistent with the AE/M wording "Loss of material/ general (steel only), pitting and crevice corrosion" and the GALL AMP XI.M32 in combination with GALL AMP XI.M1 and GALL AMP XI.M2.	See comment G-IV-S.C.-5b The option for utilizing GALL AMP XI.M32 in combination with GALL AMP XI.M1 and GALL AMP XI.M2 has been removed and should be reinstated. SRP-LR Section 3.1.2.2.7.3 also requires revision, accordingly, to specify that OTI is an acceptable verification method.	The staff agreed with this comment that the reference to the AMP should be improved. The addition of the new AMP XI.M35 for small bore piping in GALL'05 provides specific guidance and replaces the prior need for a plant-specific AMP. R-57 was rolled up into this item. The entry in the AMP column is rewritten as: Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, and Chapter XI.M2, "Water Chemistry," for BWR water and XI.M35, "One-Time Inspection of ASME Code Class 1 Small-bore Piping." The GALL Report was revised to address this proposed change.
G-IV-S.C.-07a	R-15 SRP-LR (and GALL Vol. 1) Item 11, Section 3.1.2.2.4.3	Revise existing IV.C1-5 (R-15) AMP description to be consistent with the AE/M wording "Cracking/ stress corrosion cracking and intergranular stress corrosion cracking."	AMP discussion is in error since cyclic loading is not an aging mechanism listed for this item, or for BWR items other than for jet-pump sensing lines (IV.B1-12) and Nozzles (IV. A1-3 & IV.A1-2) and loss of material for this component is addressed in Item IV.C1-6. Item IV.C1-5 corresponds to SRP-LR (and GALL Vol. 1) Item 11 and Section 3.1.2.2.4.3 whereas Item IV.C1-6 corresponds to SRP-LR Item 5	The staff agreed with this comment. The staff revised the AMP column to state, "Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for BWR water." Chapter XI.M1 is to be augmented to detect cracking due to stress corrosion cracking and verification of the effectiveness of the program is necessary to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			and Section 3.1.2.2.2.	of operation. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes. The GALL Report was revised to address this proposed change.
G-IV-S.C.-07b	R-16 SRP-LR (and GALL Vol. 1) Item 5, Section 3.1.2.2.2.2	Revise existing IV.C1-6 (R-16) AMP description to be consistent with the AE/M wording “Loss of material/ general (steel only), pitting and crevice corrosion.”	See comment G-IV-S.C.-6a. Aging effect/mechanism in the AMP discussion is not consistent with the aging effect/aging mechanism listed in that column.	The staff agreed with this comment. The staff revised the AMP to state GALL AMP XI.M2, “Water Chemistry,” for BWR water. The AMP is to be augmented by verifying the effectiveness of water chemistry control. See GALL AMP XI.M32, “One-Time Inspection,” for an acceptable verification program. The GALL Report was revised to address this proposed change.
G-IV-S.C.-08a	R-05	Since CASS is involved in both AMR line-items, simplify the AMP and combine with R-07.	The proposed change to the entry assumes the material is susceptible, but lists water chemistry as the aging management program which, by the current logic, eliminates the need for a plant-specific program. However, ISI has been conservatively added as an AMP.	The staff did not agree with this comment. The staff decided to retain both R-05 and R-07. Monitoring and control of primary water chemistry in accordance with the guidelines in EPRI TR-105714 (Rev. 3 or later revisions or updates) minimize the potential of SCC, and material selection according to the NUREG-0313, Rev. 2 guidelines of ≤0.035% C and ≥7.5% ferrite reduces susceptibility to SCC. For CASS components that do not meet either one of the above guidelines, a plant-specific aging management program is to be evaluated. The program is to include (a) adequate inspection methods to ensure detection of cracks, and (b) flaw

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				evaluation methodology for CASS components that are susceptible to thermal aging embrittlement. The GALL Report was not modified to address this comment.
G-IV-S.C.-08b	R-09	Simplify the AMP description in the AMR line-item (see comment describing proposed change to R-05)	The change to the AMP column effectively requires both the first provision (water chemistry) of the existing entry, and conservatively applies the conditional AMP (ISI).	The staff agreed with this comment. The revised AMP description in the AMR line-item reads Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water. The GALL Report was revised to address this comment.
G-IV-S.C.-09	R-125	Correct the components to read *Baffle/former assembly* Baffle/former bolts and screws Correct the environment to delete reference to fluence and Correct the AMP to include water chemistry.	The GALL Link is for B/F Bolts, not Core Barrel Assy. Looks like a typo that should be returned to the original format. Environment should be “Reactor Coolant” and AMP should be ‘Chemistry and FSAR commitment’ for consistency with the twenty-five (25) other Items in Chapter IV for this EAP. Item R-125 is the only one that uses the specified environment and the only one for this Reactor Internals MEAP that does not list Chemistry and FSAR commitment as the AMP. In GALL Rev. 0, a plant-specific AMP was used.	The staff agreed with this comment. The SSCs, environment, and AMP were revised. The AMP cell was corrected to read: “Chapter *XI.M2, “Water Chemistry,” for PWR primary water. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review*

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				and approval." The GALL Report was revised to address this proposed change
G-IV-S.C.-10	RP-14	Correct component listing to read: Steam generator *structural* anti-vibration bars; Correct materials listing to read Chrome plated *steel;* stainless steel; *n*ickel alloy	NEI suggested clarifying 'Structure and/or Component' for item grouping purposes and suggested alphabetical component listing. Chrome plated nickel alloy is incorrect for a material. Chrome plated steel is a possible material for AV bars.	The staff agreed with this comment. The staff revised the components as: "Steam generator *structural* anti-vibration bars" and revised materials to be: "Chrome plated *steel;* stainless steel; *n*ickel alloy" The GALL Report was revised to address this proposed change
G-IV-S.C.-11a	RP-21	Correct component listing to read: primary side divider plate; Correct materials listing to read Nickel alloy; steel with nickel alloy cladding. Correct AMP to delete ISI and read: GALL AMP XI.M2, "Water Chemistry," for PWR primary water-and, for Nickel alloys, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	The primary side divider plate component is not an RCPB component. The ISI Program does not directly examine this component. Previous applicants have credited only the Water Chemistry Program. This is a location of lower failure and lower consequences.	The staff agreed with this comment. The staff revised the components to be: "primary side divider plate" and revised materials to be: "Nickel alloy; steel with nickel alloy cladding." The staff decided that the AMPs for line-items RP-17 and RP-21 should remain the same. The primary side divider plate component is not an RCPB component; it is a location of lower failure and lower consequences. Thus, the AMP column was revised to state: Chapter XI.M2, "Water Chemistry," for PWR primary water." No further validation is needed because there is no adverse safety consequence should through wall cracking occur on this component. The GALL Report was revised to address this proposed change.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IV-S.C.-11b	RP-17	Correct component listing to read: primary side divider plate; Correct AMP to delete ISI and read:, "GALL AMP XI.M2, "Water Chemistry," for PWR primary water-and, for Nickel alloys, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines."	The primary side divider plate component is not an RCPB component. The ISI Program does not directly examine this component. Previous applicants have credited only the Water Chemistry Program. This is a location of lower failure and lower consequences.	The staff agreed with this comment. The staff revised the components to be: "primary side divider plate." The staff revised the components to be: "primary side divider plate" and stipulated materials to be: "stainless steel." The staff decided that the AMPs for RP-17 and RP-21 should remain the same. The primary side divider plate component is not an RCPB component; this is a location of lower failure and lower consequences. Thus, the referenced AMP column was revised to read: GALL AMP XI.M2, "Water Chemistry," for PWR primary water." No further validation is needed because there is no adverse safety consequence should through wall cracking occur on this component. The GALL Report was revised to address this proposed change.
G-IV-S.C.-12a	R-42	Clarify component listing to read: *Steam generator structural* Tube support plates;	NEI suggested clarifying 'Structure and/or Component' for item grouping purposes and suggested alphabetical component listing. It's not clear whether the aging effect for "Ligament cracking/ corrosion" is Cracking, LOM, or both. Entry should be clarified. SRP-LR Table 3.1-1 Item 65 should also be clarified.	The staff agreed with this comment. The staff revised the components to be: "*Steam generator structural* Tube support plates." The AE/M was not revised because Ligament cracking/ corrosion" is a specific AE/M combination. The GALL Report was revised to address this proposed change.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IV-S.C.-12b	R-38	Clarify component listing to read: *Steam generator components* FW and AFW nozzles and safe ends Steam nozzles and safe ends	NEI suggested clarifying 'Structure and/or Component' for item grouping purposes and suggested alphabetical component listing.	The staff agreed with this comment. The staff revised components to be, "*Steam generator components* FW and AFW nozzles and safe ends Steam nozzles and safe ends." The GALL Report was revised to address this proposed change.
G-IV-S.C.-12c	R-35	Clarify component listing to read: *Primary side* components Upper and lower heads Tube sheets	NEI suggested clarifying 'Structure and/or Component' for item grouping purposes and suggested alphabetical component listing.	The staff agreed with this comment. The staff revised components to be: "Primary side components; Upper and lower heads; Tube sheets and tube-to-tube sheet welds." The GALL Report was revised to address this proposed change.
G-IV-S.C.-13	R-57	Revise materials to remove steel with stainless steel cladding. Revise AMP description to delete specific reference to service-induced weld cracking.	Small bore piping is not clad with stainless steel, but small bore RCS piping is stainless steel. The AMP description still includes attributes that are specific to SCC (but are not applicable to thermal and mechanical loading).	The staff agreed with this comment. When the S&C was revised, this AMR line-item fell into the MEAP combination represented by R-02, and thus R-57 was deleted. The AMR line-item R-02 adequately addresses the intent of R-57 and thus the GALL Report was modified to address this comment.
G-IV-S.C.-14	R-01 R-218	Consolidate minor component and material modifications into R-01 and delete R-218. Add safe ends to components listing, Add steel with alloy cladding to the materials listing, add IV.D1.1-i to the link.	The differences between R-01 and R-218 were trivial thus logically they should be combined. SRP-LR Table 3.1-1 Item 22 should also be updated to remove R-218 from the 'Related Item' field.	The staff agreed with this comment. The link for R-01 was revised to be: IV.D1.1-i IV.D1.1-j IV.D2.1-h The S&C were revised to be instrument penetrations and primary side nozzles, safe ends, and welds. The materials were revised to be Nickel alloy or steel

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				with nickel alloy cladding. The GALL Report was revised to address this proposed change.
G-IX-GC-7	IX-Table C	Revise the definition of SS to include CASS in Table C for Definition of Materials in Chapter IX.	CASS and stainless steel share the same aging effects/ mechanisms in GALL except for thermal and neutron irradiation embrittlement. (also see endnotes to this table)	See the staff's disposition of NEI Comment G-IV-GC-7. The GALL Report was revised to address this proposed change.
NRC G-IV-1	R-102	Delete the AMR line-item concerning cracking due to cyclic loading of SS jet pump sensing line. In GALL'01, the AMR line-item pointed to a plant-specific AMP as being the management approach.	The staff pointed out a staff-approved precedent stating that pressure boundary components of active instrumentation may be excluded from AMR because the functional degradation resulting from aging effects on active functions is readily determinable from existing programs and requirements (for example, NUREG-1705, 1999). The jet pump sensing line is an instrumentation line that measures the flow amount of the jet pump, by measuring the difference of pressure between the upper part and the exit of the diffuser. On the other hand, other staff stated that jet pump sensing line should be within the scope of license renewal, but can often be screened out from requiring AMR. AMR line-item (R-101) [B1.4-c] addresses	The staff did not agree with the proposed change. The jet pump sensing line is within the scope of license renewal, and may need an AMR. Thus this AMR line-item is retained. The GALL Report was not revised to address this proposed change.

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			thermal aging and neutron embrittlement of jet pump assembly castings. AMR line-item (R-100) [B1.4-a] addresses cracking of jet pump assembly components. AMR line-item (R-69 [A1.5-a] addresses cracking of jet pump penetrations. Of the four, the AMR line-item concerning cracking due to cyclic loading of SS jet pump sensing line, was the only one managed by a plant-specific AMP.	
NRC G-IV-2	R-98	Although the description of top guide program scope had been placed in AMP XI.M9, the staff still wanted it included in the AMP column.	The staff wanted to ensure that this guidance was followed by licensees during the license renewal process.	The staff agreed with this comment. The AMP was revised to state: *"GALL AMP XI.M9, "BWR Vessel Internals," for top guide and GALL AMP XI.M2, "Water Chemistry," for BWR water. For top guides with neutron fluence exceeding the IASCC threshold (5E20, E>1 MeV) inspect ten (10) percent of the top guide locations using enhanced visual inspection technique, EVT-1 within 12 years, one-half of the inspections (5% of locations) to be completed within 6 years. Locations selected for examination will be areas that have exceeded the neutron fluence threshold in the areas of highest projected neutron fluence. The extent and frequency of examination of the top guide is similar to the examination of the control rod drive housing guide tube in BWRVIP-47."*

Table A.2.3: Disposition of NEI Comments on Chapter IV of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				The GALL Report was revised to address this proposed change.
NRC G-IV-3	R-25	Delete the reference to Ni alloys or Alloy 600 in the AMP description.	The predominant materials are steel or stainless steel. In GALL'01, the AMP also stated that "Cracks in the pressurizer cladding could propagate from cyclic loading into the ferrite base metal and weld metal. However, because the weld metal between the surge nozzle and the vessel lower head is subjected to the maximum stress cycles and the area is periodically inspected as part of the ISI program, the existing AMP is adequate for managing the effect of pressurizer clad cracking."	The staff agreed with this comment. The staff revised the AMP column to state, "*AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and AMP XI.M2, "Water Chemistry," for PWR primary water."* The GALL Report was revised to address this proposed change.

Endnotes Clarifying General Comments Provided by NEI

1. **General Comment 1 (GC1) for New AMR Line-Items:** NEI proposed new AMR line-items are listed are designated "New IV.X(Y) where X is the table identifier and Y is a sequential number for new lines in that table. Where the same line-item is proposed in multiple tables, the other tables are listed below the designation.

2. **General Comment 2 (GC2) for Stainless Steel in Treated Borated Water:** Neither the 2001 version of the GALL Report nor the January 2005 draft revision address the aging effect of loss of material for stainless steel in a treated borated water environment. Some sections of GALL note that the effect is minor and specifically not mentioned in GALL. For example, the introductory text to table IV.C2 says: The effects of pitting and crevice corrosion on stainless steel components are not significant in treated borated water and, therefore, are not included in this section.

   NEI pointed out that operating experience has shown loss of material to be a negligible effect because the water chemistry requirements minimize contaminants that would lead to loss of material. In other words, the water chemistry programs for PWRs manage the aging effect of loss of material. Although the effect is minor, past applications have listed (and future applications will list) loss of material as an aging effect for stainless steel in a treated borated water environment with water chemistry as the aging management program. Because the aging effect is minor, the water chemistry program by itself is sufficient to manage this aging effect, as evidenced by past operating experience.

   This was acknowledged in previous SERs including the following excerpt from Farley SER Section 3.1.2.3.1.2, *Pitting corrosion and crevice corrosion may occur in ASME Code, Class 1, stainless steel or NiCrFe components under exposure to aggressive, oxidizing environments. Normally, the presence of elevated dissolved oxygen and/or aggressive ionic impurity concentrations is necessary to create these oxidizing environments in the RCS. The applicant's response to RAI 3.1.3.1.1-1, Part b, provides an acceptable explanation for citing the Water Chemistry Control Program as a basis for minimizing the dissolved oxygen and ionic impurity concentrations that could otherwise, if left present in high concentrations, lead to an aggressive, oxidizing RCS coolant environment. The GALL Report does not indicate that the loss of material due to pitting corrosion or crevice corrosion is an aging effect of concern for stainless steel or NiCrFe ASME Code Class 1 components. Since the applicant has conservatively assumed that the loss of material due to pitting corrosion or crevice corrosion is an applicable aging effect for these RV components, the staff concludes that the Water Chemistry Control Program provides a sufficient mitigative strategy for managing this aging effect relative to the recommendations of the GALL Report.*

   NEI proposed new lines for systems where this MEAP is appropriate. The introductory text indicating the effect is not addressed is deleted.

3. **General Comment 3 (GC3) Water Chemistry Reference:** NEI pointed out that the reference to the specific EPRI document need not be included in the Aging Management Program column. This information is identified in the AMP description in Chapter XI of GALL.

4. **General Comment 4 (GC4) Alloy 600 to Nickel Alloys:** Aging issues commonly associated with Alloy 600 also affect other nickel alloys such as Alloy 690/52/152. Where appropriate, the term “Nickel Alloys” should replace Alloy 600 to include the broader range of materials (this term is defined in GALL Chapter IX).

5. **General Comment 5 (GC5) Add Nickel Alloys:** Materials for certain items may include nickel alloy in addition to stainless steel; e.g., PWR RVI baffle former bolts. Similarly, some items currently listed, as nickel alloy can also be steel clad with nickel alloy, e.g., SG primary side components. The added materials are subject to the same aging effects as those currently listed.

6. **General Comment 6 (GC6) Bolting:** NEI suggested that, consistent with its Chapter IX comment, high strength low alloy steel should be ‘Low alloy steel.’ Also, bolt strength does not impact the fatigue or wear aging mechanisms.

   NEI further said that, although some utilities have conservatively applied loss of preload as aging effect for bolting, the industry does not consider loss of preload as an aging effect requiring management. In accordance with EPRI 1003056, “Mechanical Tool,” Appendix F, loss of preload is a design driven effect and not an aging effect requiring management. The bolting at most facilities is standard grade B7 carbon steel, or similar material, except in rare specialized applications. Loss of preload due to stress relaxation (creep) for this material can only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code Section II Part D Table 4 Note 4. However, there is no bolting used in BWRs and PWRs that operate at 700°F, with the exception of unique applications, such as the emergency diesel generator exhaust. Therefore, loss of preload due to stress relaxation (creep) is not a valid aging effect.

   In addition, NEI stated that the industry has taken actions to address NUREG –1339, “Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants.” Licensees have implemented good bolting practices in accordance with those referenced in EPRI NP-5769, EPRI NP-5067, and EPRI TR-104213 in normal maintenance and design activities. Normal maintenance and design activities thus address the potential for loss of preload such that it is not a concern for the current or extended operating term. Proper joint preparation and make-up in accordance with industry standards precludes loss of preload. Even other design factors that could contribute to a loss of preload in closure bolting applications, such as vibration, should not result in loosening in a properly designed and assembled bolted joint.

   NEI suggested that he impact to the GALL tables is that, with elimination of loss of preload as an aging effect, closure bolting has the same MEAP as external surfaces and the lines could be combined.

7. **General Comment 7 (GC7) Integration of CASS with Stainless Steel:** NEI pointed out that cast austenitic stainless steel (CASS) is currently treated as a separate material in GALL. However, with the exception of the loss of fracture toughness due to thermal and neutron irradiation embrittlement, CASS and stainless steel share the same aging effects/mechanisms in GALL.

   To simplify GALL, NEI suggested that CASS should be treated as a subset of stainless steel. CASS would only be listed as a material when loss of fracture toughness due to thermal (or thermal and irradiation) embrittlement is at issue, or where unique AMP requirements are given. This would provide consistency with GALL's treatment of other material groups, e.g., gray cast iron as a subset of steel, and copper alloy >15% zinc as a subset of copper alloy. Gray cast iron and copper alloy >15% zinc are both susceptible to selective leaching and are only listed as materials when selective leaching is addressed.

   NEI summarized that this change will have the added benefit of eliminating the need for new MEAP combinations to address CASS in non-Class 1 systems where stainless steel is adequately evaluated but CASS, if it is to be considered a separate material, is not. CASS is currently listed in only a few lines in Chapters V and VII and not at all in Chapter VIII.

8. **General Comment 8 (GC8) Composite Component Descriptions:** NEI pointed out that the combination of some lines to produce generic lines resulted in structure/component descriptions that included the components previously (GALL'01) listed in the individual lines. These comprehensive lists include components that do not apply to all system/structure tables. For example, in table IV.A1 for BWR vessels,line-itemR-04 addresses fatigue for "Piping, piping components, and piping elements; flanges; heater sheaths and sleeves; penetrations; pressure housings; pump casing/cover; spray head; thermal sleeves; vessel shell heads and welds." Some of these components are not applicable to BWR vessels and may lead to confusion when comparing plant AMR results to this line-item of GALL.

   NEI noted that the September 2004 version of GALL used generic descriptions, such as "Piping, piping components, and piping elements." The reason for the switch from the generic name used in the September version to the compound name in the January version is unclear. The compound names will create confusion because specific component types are listed in systems that don't contain those components.

   NEI noted that if it is important to maintain the list of component types, component names in the rolled up lines should be split to their original configuration so that the list of component types matches the system. Alternatively, the component names should be restored to the generic names used in September. As a general rule, a generic line-item (rolled up line) should not be created unless the component description can be simplified to be applicable to the systems that use it.

9. **General Comment 9 (GC9) Commitments:** NEI pointed out that the Aging Management Program entries for many lines have been changed. In many lines, AMPs described in GALL Chapter XI were replaced by commitments to be specified in the FSAR supplement. These commitments are less well defined than the programs they replaced. Four different commitment statements were used in the GALL lines. They are discussed further below, identified by key phrases in each.

(GC9a) "Provide a commitment to implement applicable.(2) staff-accepted industry guidelines." Most of the lines that now list this commitment previously listed a GALL described AMP such as XI.M11 no longer existed, "Ni-alloy Nozzles and Penetrations or ISI." The Bases Document does not explain why these programs were replaced by an open-ended commitment. The commitment itself is unclear.

(GC9b) "submit plant-specific AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces" Clarification is requested regarding the meaning of "submit plant-specific AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces." Is a plant-specific program required only if there are applicable Generic Communications?

(GC9c) "upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan." This commitment statement appears in a large number of lines associated with PWR internals. The AMP XI.M16, "PWR Vessel Internals" was formerly used for these lines. This GALL described program was credited in prior approved applications. The reason for the change is unclear and the proposed commitment is also unclear. If the industry develops a staff accepted program, then submittal of the program would seem unnecessary. What is the intent of submittal 24 months prior to the POEO? Would submittal 24 months before any proposed inspection be an acceptable reword?

(GC9d) "submit, for NRC review and approval, an inspection plan for tube support lattice bars" This commitment occurs in only one line. The line-item originally referred to a plant-specific program.

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-V-GC-1a	EP-39	NEI recommends the creation of a new AMR line-item to address the aging effect of reduction of heat transfer on copper alloy heat exchanger tubes exposed to closed cycle cooling water environment. The aging management program recommended by NEI was GALL AMP XI.M21, "Closed-Cycle Cooling Water System."	NEI stated that the reduction of heat transfer due to fouling of copper alloy heat exchanger tubes was not been addressed previously. EP-35 already exists to manage fouling of stainless steel tubes, and because the AMP provides for management of surface fouling, this program can also be applied here (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. A new AMR line-item was added as proposed by NEI. The GALL Report was revised to address this proposed change.
G-V-GC-1b	EP-40	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of reduction of heat transfer/fouling in steel heat exchangers tubes subject to lubricating oil environment. The aging management program recommended by NEI was a plant-specific program.	NEI noted that the D.C. Cook SER Section 3.2.2.3.3 acknowledged the potential for fouling of copper alloy components in a lubricating oil environment. The SER addressed components in a PWR ECCS system, but these conditions would be equally applicable to components of other lube oil systems. Steel heat exchanger tubes would also be subject to fouling in a lubricating oil environment (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. A new AMR line-item was added as proposed by NEI. However, the AMP and FE columns were revised to refer to GALL AMP XI.M39, "Lubricating Oil Analysis," which was developed to identify an acceptable means of managing aging of these components. The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. GALL AMP XI.M32, "One –Time Inspection," is an acceptable verification program. The GALL Report was revised to address this proposed change.
G-V-GC-1c	EP-42	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of loss of material/general, pitting, and crevice corrosion in steel encapsulated components	NEI stated that encapsulation components are not currently GALL items, but a precedent exists for including these items based on the Millstone and Farley LRAs and corresponding staff	The staff agreed with this comment. A new AMR line-item was added as proposed by NEI. However, the AMP and FE columns were revised to refer to GALL AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		subject to Air – indoor uncontrolled (internal) environment. The aging management program recommended by NEI was a plant-specific program.	reviews. The staff aging management programs identified by these applicants for these material and environment combinations for loss of material in the SERs, Millstone SER Section 2.3A.2.3, and Farley SER Section 3.2.2.2.2 (see also the endnotes to this table for NEI's presentation of general comment 1).	Piping and Ducting Components." The GALL Report was revised to address this proposed change.
G-V-GC-1d	EP-43	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of loss of material/general, pitting, and crevice corrosion in steel encapsulated components subject to air with borated water leakage (internal) environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that encapsulation components are not currently GALL items, but a precedent exists for including these items based on the Millstone and Farley LRAs and corresponding staff reviews. The staff aging management programs identified by these applicants for these material and environment combinations for loss of material in the SERs, Millstone SER Section 2.3A.2.3, and Farley SER Section 3.2.2.2.2 (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The AMP and FE columns were also revised to refer to GALL AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components." The GALL Report was revised to address this proposed change.
G-V-GC-1e	EP-44	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of cracking/stress corrosion cracking of stainless steel piping, piping elements exposed to closed cycle cooling water > 60º C (>140º F) environment.	NEI stated that existing GALL row AP-60 is also applicable to components in ESF systems where closed cooling water temperatures exceed 60º C or 140º F in supporting systems such as bearing and lube oil coolers (see also the endnotes to	The staff agreed with this comment. The staff agreed that existing item AP-60 can be extended to cover components in ESF systems where closed cooling water temperatures exceed 140º F in supporting systems such as bearing and lube oil coolers and associated piping that are considered part of the ESF

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		The aging management program recommended by NEI was GALL AMP XI.M21, “Closed-Cycle Cooling Water System.”	this table for NEI’s presentation of general comment 1).	systems. Also, EP-33 addresses a different aging mechanism for this same group of components. The GALL Report was revised to address this proposed change.
G-V-GC-1f	EP-45	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of loss of material/pitting and crevice corrosion of copper alloy piping, piping components and piping elements exposed to lubricating oil environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that the bases for AP-47 and SP-32 are also applicable to components such as pump and motor lubricating oil systems that are included as ESF systems (see also the endnotes to this table for NEI’s presentation of general comment 1).	The staff agreed with this comment. In the Fort Calhoun Station SER 3.3.2.4.14, the staff took the position that copper-alloy in a lubricating oil environment exhibits a loss of material and therefore requires an aging management program. The AMP and FE columns were revised to refer to GALL AMP XI.M39, “Lubricating Oil Analysis,” which was developed to identify an acceptable means of managing aging of these components. The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. GALL AMP XI.M32, “One –Time Inspection,” is an acceptable verification program. The GALL Report was revised to address this proposed change.
G-V-GC-1g	EP-46	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of loss of material/general, pitting and crevice corrosion of steel piping, piping components, and piping elements exposed to lubricating oil environment. The aging management program	NEI stated that the bases for AP-30 and SP- 25 are applicable to components such as pump and motor lubricating oil systems that are included as ESF systems (see also the endnotes to this table for NEI’s presentation of general comment 1).	The staff agreed with this comment. The basis for the acceptance of this comment is the same disposition as comment G-V-GC-1f. The GALL Report was revised to address this proposed change.

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		recommended by NEI was a plant-specific program.		
G-V-GC-1h	EP-47	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of reduction of heat transfer/ fouling in copper alloy heat exchangers tubes subject to lubricating oil environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that in the D.C. Cook SER Section 3.2.2.3.3, the staff acknowledged the potential for fouling of copper alloy components in a lubricating oil environment. The SER addressed components in a PWR ECCS system, but these conditions would be equally applicable to components of other lube oil systems (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. A new AMR line-item was added as proposed by NEI. The AMP and FE columns were revised to refer to GALL AMP XI.M39, "Lubricating Oil Analysis," which was developed to identify an acceptable means of managing aging of these components. The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. GALL AMP XI.M32, "One –Time Inspection," is an acceptable verification program. The GALL Report was revised to address this proposed change.
G-V-GC-1i	EP-48	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of loss of material/general, pitting and crevice corrosion on steel piping, and piping components, and piping elements, internal surfaces exposed to closed cycle cooling water environment. The aging management program recommended by NEI was Chapter XI.M21, "Closed-Cycle Cooling Water System."	NEI stated that This is the same as line-items RP-10 and A-25 and that this also should be extended to the containment isolation components (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. A similar MEAP combination exists as item E-17 and the staff agreed to extend this item to the containment isolation components. The GALL Report was revised to address this proposed change.
G-V-GC-1j	EP-49	NEI recommends the creation of a new AMR line-item to address the aging effect of	NEI stated that unique problems with stainless steel cladding have been identified in high head safety	The staff agreed with this comment. A new AMR line-item EP-49 was

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		cracking/under clad cracking of steel with stainless steel clad for pump casings exposed to treated borated water. The aging management program recommended by NEI was a plant-specific program.	injection pump as noted in NRC IN 94-63, Boric Acid Corrosion of Charging Pump Casings caused by Cladding Cracks," (see also the endnotes to this table for NEI's presentation of general comment 1).	created.
G-V-GC-1k	EP-50	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of reduction of heat transfer/fouling in stainless steel heat exchanger tubes in a lubricating oil environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that this line-item is similar to EP-40 and 47 (see G-V-GC-1b and G-V-GC-1h, respectively) except for a different material. Heat exchanger tubes of stainless steel would also be subject to fouling in a lubricating oil environment (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The AMP and FE columns were also revised to refer to GALL AMP XI.M39, "Lubricating Oil Analysis," which was developed to identify an acceptable means of managing aging of these components. The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. GALL AMP XI.M32, "One –Time Inspection," is an acceptable verification program. The GALL Report was revised to address this proposed change.
G-V-GC-1l	EP-51	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of loss of material/pitting and crevice corrosion of stainless steel piping, piping components, and piping elements when exposed to lubricating oil environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that GALL assumes water pooling for the lubricating oil environment; therefore, loss of material is a plausible aging effect that should be managed (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The AMP and FE columns were also revised to refer to GALL AMP XI.M39, "Lubricating Oil Analysis," which was developed to identify an acceptable means of managing aging of these components. The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. GALL AMP XI.M32, "One –Time Inspection," is an acceptable verification program.

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				A new AMR line-item EP-51 was created. The GALL Report was revised to address this proposed change.
G-V-GC-1m	EP-52	NEI recommends the creation of a new AMR line-item to address the aging effect/mechanism of loss of material/selective leaching for gray cast iron heat exchanger components in a closed cycle cooling water. The aging management program recommended by NEI was Chapter XI.M33, "Selective Leaching of Materials."	NEI stated that existing GALL rows AP-31 and SP-27 are similar to proposed line-item except they apply to treated water environments. In the closed cycle cooling water environment, gray cast iron exhibits a loss of material due to selective leaching and therefore requires management by a program (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. A new AMR line-item EP-52 was created.
G-V-GC-1n	EP-53	NEI recommends the creation of a new AMR line-item to address the aging effect/mechanism of loss of material/pitting and crevice corrosion for stainless steel piping, piping components, piping elements, and tanks when exposed to internal condensation environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that the RWST vent line in the Farley LRA is an example of this material/environment/aging effect combination (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The addition of this item extends the MEAP combination for BWRs contained in E-14 to PWRs. The GALL Report was revised to address this proposed change. A new AMR line-item EP-53 was created.
G-V-GC-1o	EP-54	NEI recommends the creation of a new AMR line-item to address the aging effects/mechanism of loss of material/selective leaching on gray cast iron piping, piping components, and piping elements exposed to soil. The aging management	NEI stated that the bases for AP-42 and SP-26 are applicable for buried gray cast iron components of the standby gas treatment system. E-42 added steel in soil for standby gas treatment system components. This proposed line-item	The staff agreed with this comment. An approved precedent exists for adding this material, environment, aging effect and program combination item to the GALL Report. As shown in the Fort Calhoun Station SER 3.3.2.4.16, the staff has accepted the position that gray cast iron in a soil environment exhibits a

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		program recommended by NEI was Chapter XI.M33,"Selective Leaching of Materials."	addresses gray cast iron as a subset of those steel components (see also the endnotes to this table for NEI's presentation of general comment 1).	loss of material due to selective leaching and therefore requires management by a program. The GALL Report was revised to address this proposed change. A new AMR line-item EP-54 was created.
G-V-GC-1p	EP-55	NEI recommends the creation of a new AMR line-item to address the aging effect/mechanism of loss of material/pitting and crevice, and microbiologically influenced corrosion in stainless steel piping, piping components, and piping elements, when exposed to raw water environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that GALL row E-34 addresses the same material, environment, aging effect, and plant-specific program for containment isolation piping and components. See IN 85-30 for evidence of micro-biologically influenced corrosion (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. A new AMR line-item EP-55 was created.
G-V-GC-2	EP-41	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of loss of material/ pitting and crevice corrosion for stainless steel and stainless steel cladding piping, piping components, and piping elements in a treated borated water environment. The aging management program recommended by NEI was GALL AMP XI.M2, "Water Chemistry," for PWR primary water.	Pitting and crevice corrosion may occur in ASME Code Class 1 stainless steel components under exposure to aggressive, oxidizing environments. Because the aging effect is minor, the water chemistry program by itself is sufficient to manage this aging effect, as evidenced by past operating experience (precedent based on Farley SER Section 3.1.2.3.1.2, and applicant's response to RAI 3.1.3.1.1-1) (see also the endnotes to this table for NEI's presentation of general comment 2)	The staff agreed with this comment. The GALL Report was revised to address this proposed change. A new AMR line-item EP-41 was created.
G-V-GC-3a	E-08	NEI recommended deletion of	NEI stated that the reference to	The staff agreed with this comment.

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	E-37 EP-32	the reference to EPRI document TR103515 from the AMP column in the line-items.	this specific EPRI document need not be included in the line-item AMP columns because this information is provided in Chapter XI.M2. Within the AMR line-items, it is adequate and internally consistent simply to reference AMP XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515) as GALL AMP XI.M2, "Water Chemistry," for BWR water (see also the endnotes to this table for NEI's presentation of general comment 3).	Previously, BWRVIP-29 (EPRI TR-103515) was referenced in the AMP column of the AMR line-items; The AMP column was revised to read: "Chapter XI.M2 "Water Chemistry, "for BWR water." The GALL Report was revised to address this proposed change.
G-V-GC-3b	E-12 E-38	NEI recommended deletion of the reference to EPRI document TR105714 from the AMP column in the line-items.	NEI stated that the reference to this specific EPRI document need not be included in the line-item AMP columns because this information is provided in XI.M2, the AMP description in Chapter XI of GALL. Within the AMR line-items, it is adequate and internally consistent simply to reference AMP XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-105714 as GALL AMP XI.M2, "Water Chemistry," for PWR secondary water (see also the endnotes to this table for NEI's presentation of general comment 3).	The staff agreed with this comment. Previously, EPRI TR-105714 was referenced in the AMP column of the AMR line-items; The staff revised the AMP Column to read: "Chapter XI.M2," Water Chemistry "for PWR primary water." The GALL Report was revised to address this proposed change.
G-V-GC-4	E-02 E-06 E-26 E-28 E-30	NEI recommended deletion of the line-items that address the external surfaces of components and bolting from the applicable systems table and move them to	NEI stated that the appropriate location for line-items that address external surfaces is for all to be co-located in the new external surfaces aging	The staff did not agree with this comment. The staff noted that it was important for its reviewers to know to what system each line-item belonged; this information was important and useful

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	E-35 E-40 E-42 E-44 E-45 EP-2 EP-24 EP-31	a new external surfaces aging management program table. NEI proposed to add this AMP "External Surfaces Monitoring."	management program table rather than within their applicable system tables, but that line-items that refer to a unique aging management program, e.g., the fire protection program, which monitors fire doors, should remain with the appropriate systems table (see also the endnotes to this table for NEI's presentation of general comment 4).	in performing its reviews to know which specific systems are addressed by which line-items. The staff thus decided that it was more beneficial to the reviewer to include each line-item in its appropriate system rather than to group these components by the surface to be examined. The GALL Report was not revised to address this proposed change. For E-26, E-30, E-35, E-40, E-44, and E-45 the AMP Columns were changed to GALL XI.M36, "External Surfaces Monitoring" program.
G-V-GC-5	E-17 E-18 E-19 E-20 EP-52 EP-13 EP-37	NEI recommended deletion of the references to reactor type and to heat exchanger shell and tube side components, as appropriate.	NEI stated that many GALL items referring to heat exchanger components indicate whether the line-item applies to the tube side or the shell side. However, the designation of the tube side or shell side of a heat exchanger unnecessarily limits the applicability of the GALL line-item. Small heat exchangers in particular can be configured with the cooled fluid on either the shell or tube side. For heat exchangers with a given set of materials and environments, the configuration of the heat exchanger (tube side vs. shell side) will not alter the aging effects or the aging management programs. Consequently, the component descriptions for these	The staff agreed with this comment. The staff agreed that the aging effects and aging programs are applicable to the component, regardless of heat exchanger design, (i.e., of either shell or tube side) thus, it was appropriate to include both sides, not just one. (Note: As a result of these changes, row A-85 was deleted because it was identical to A-71) The GALL Report was revised to address this proposed change.

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			lines should be changed to delete the tube side or shell side designation (see also the endnotes to this table for NEI's presentation of general comment 5).	
G-V-GC-6	EP-24	NEI recommended the deletion of this AMR line-item.	NEI stated that loss of preload is not an aging effect (see also the endnotes to this table for NEI's presentation of general comment 6).	The staff agreed with this comment. The staff agreed that loss of preload due to stress relaxation (creep) can only be a concern in very high temperature applications (> 700°F). In EPRI TR-104213 and EPRI NP-5067, loss of preload due to gasket creep, thermal effects (including differential expansion and creep or stress relaxation), and self-loosening (which includes vibration, joint flexing, cyclic shear loads, thermal cycles) is discussed. The staff determined that this combination of aging mechanisms will replace 'stress relaxation.' Thus the replacement aging effect/aging mechanism will be loss of preload/ thermal effects, gasket creep, and self-loosening. The GALL Report was modified to address this comment.
G-V-GC-7	EP-8	NEI recommended the deletion of these line-items.	NEI stated that cast austenitic stainless steel is addressed by other GALL rows for stainless steel effect (see also the endnotes to this table for NEI's presentation of general comment	The staff agreed with this comment. A-101, A-41, and A-42 are enveloped by A-61, A-60, and A-62, respectively. The GALL Report was revised to address this proposed change.

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-V-C-1	EP-33	NEI recommends adding the term “internal surfaces” to the structure and/or component column for this GALL row.	NEI stated that the addition of “internal surfaces” will be consistent with the rest of GALL AMP XI.M21.	The staff did not agree with this comment. There are no other GALL rows that credit GALL AMP XI.M21 that specify “internal surfaces” in the structure and/or component column. The term “Piping, piping components, and piping elements” assumes the internal surfaces since the external surfaces are usually managed by a different program. The environment was changed from “Air and Steam” to “Steam” because it is steam environment that gives rise to potential for flow –accelerated corrosion. The GALL Report was not revised to address this proposed change.
G-V-C-2	E-07	NEI recommends changing the environment addressing the aging effect/mechanism of wall thinning/flow accelerated thinning on steel piping from air and steam to steam only.	NEI stated that the change in environment from “Air and steam” to “Steam” is because the steam lines to the HPCI and RCIC Turbine, for which this NUREG 1801 line-item was meant for, is rarely used since these steam lines are used less than 2% of the time and are therefore not susceptible to flow accelerated corrosion. The steam drain lines however, see constant steam flow and are therefore susceptible to flow accelerated corrosion.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
G-V-C-3	E-01 E-34	NEI recommends changing the environment from untreated water to raw water.	NEI stated that this change is consistent with the conforming change in Chapter IX.	The staff agreed with this comment. The terminology for this environment was changed to remove “Untreated Water” and instead us “Raw Water.” Due to the additional roll-up, AMR line-item E-

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				32 was subsumed by E-22. The GALL Report was revised to address this proposed change.
G-V-C-4	E-37	NEI recommends adding GALL AMP XI.M32, “One Time Inspection,” for managing this aging mechanism, as an alternate choice to verify effectiveness of the water chemistry to prevent cracking.	NEI stated that GALL AMP XI.M7, “BWR Stress Corrosion Cracking” is essentially the applicant’s response to Generic Letter (GL) 88-01, which required increased ISI inspections and piping material replacement within the reactor coolant pressure boundary. The GALL Report assigns this AMP for ECCS systems, specifically in GALL lines V.D2.1-c and V.D2.3-c. Typically the ECCS Systems do not fall under the guidance of GL 88-01. The reactor coolant pressure boundary of the ECCS systems may be covered under GL-88-01; however those portions of the ECCS systems are included under GALL Chapter IV (Reactor Coolant Pressure Boundary), lines IV.C1.1-f and IV.C1.3-c. Therefore, a One-Time Inspection AMP should be available as an alternate choice to verify effectiveness of the water chemistry to prevent cracking.	The staff did not agree with this comment. GALL AMP XI.M7 needs to be supplemented by GALL AMP XI.M2, “Water Chemistry,” in order to mitigate damage caused by corrosion and stress corrosion cracking. As noted in GALL AMP XI.M7, the program delineated in NUREG-0313 and NRC GL 88 01 does not provide specific guidelines for controlling reactor water chemistry to mitigate intergranular stress corrosion cracking. Maintaining high water purity reduces susceptibility to stress corrosion cracking or intergranular stress corrosion cracking. Reactor coolant water chemistry is monitored and maintained in accordance with the guidelines in BWRVIP 29 (Electric Power Research Institute [EPRI] TR-103515). The program description, and evaluation and technical basis of monitoring and maintaining reactor water chemistry are presented in GALL AMP XI.M2, “Water Chemistry.” This is consistent with other GALL rows (i.e., R-20, R-21, R-68, and A-61). The GALL Report was not revised to address this proposed change.
G-V-C-5	E-38	NEI recommends deleting the line-item which addresses the aging effect/mechanism of	NEI stated that this is included in line-item E-12, and that GALL AMP XI.M2, “Water Chemistry,”	The staff did not agree with this comment. The staff decided to retain this item so that the stainless steel cladding

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		cracking/stress corrosion cracking of steel with stainless steel cladding in safety injection tanks (accumulators) in a treated borated water >60º C (>140 º F) environment.	for PWR primary water in EPRI TR-105714 addresses this issue.	issue is kept separate and because the stainless steel cladded safety injection tank should not be generalized as a typical tank. The GALL Report was not revised to address this proposed change.
G-V-C-6	E-43	NEI recommended the use of the term heat exchangers instead of Motor Coolers.	NEI stated that the term “motor cooler” is the same as a heat exchanger.	The staff did not agree with this comment because a motor cooler is not the same as a heat exchanger. The GALL Report was not revised to address this proposed change.
G-V-C-7	EP-32	NEI recommends using AMP GALL AMP XI.M2, “Water Chemistry” instead of plant-specific for BWR water to manage the aging effect/management of loss of material/pitting and crevice corrosion on stainless steel piping, piping components, and piping elements exposed to treated water environment.	NEI stated that the change will be consistent with NUREG 1801 lines VII.E4.1-a (A-35) and VIII.E.5.-b (S-13).	The staff agreed with this comment. The AMP Column was revised to read: “Chapter XI.M2, “Water Chemistry,” for BWR water. The AMP is to be verifying the effectiveness of Water Chemistry The GALL Report was revised to address this proposed change.
G-V-C-8	EP-21 (deleted as result of advise during public comment period)	NEI recommends to add, “No water pooling” to the lubricating oil environment column.	NEI stated that GALL assumes water pooling for the lubricating oil environment. The industry assumes that if water pooling is present, loss of material is a plausible aging effect that should be managed. To support a finding of no aging effect, the environment should be annotated to exclude water pooling.	The staff agreed with NEI that with water pooling is present in lubricating oil loss of material is a plausible aging effect that should be managed, The definition of lubricating oil stipulates the possibility of moisture or contamination, “Lubricating oils are low-to-medium viscosity hydrocarbons, with the possibility of containing contaminants and/or moisture, used for bearing, gear, and engine lubrication. The GALL AMP XI.M39 “Lubricating Oil Monitoring”

Table A.2.4: Disposition of NEI Comments on Chapter V of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				addresses this environment. Piping, piping components, and piping elements, whether copper, stainless steel, or steel, when exposed to lubricating oil that does not have water pooling, will have limited susceptibility to aging degradation, due to general or localized corrosion." The GALL Report was revised to address this proposed change.
G-V-C-9	New V.F(1)	NEI recommended the creation of a new AMR line-item for the external surfaces of steel piping, piping components, and piping elements in a containment (inert) environment. NEI recommended no aging effect of aging management program for this new row.	NEI stated that this comment is similar to one they had on GALL Chapter IX on Containment environment (inert).	The staff did not agree with this comment. There are situations where the containment is not inerted, for example, during outages the environment is not inerted, and when inerted, leakage is allowed per the Technical Specifications. Potential exists for aging effects due to these conditions. The GALL Report was not revised to address this proposed change.

Endnotes Clarifying General Comments Provided by NEI

1. **General Comment 1 (GC1) for New AMR Line-Items:** NEI proposed new AMR line-items which are listed at the end of each table. The new lines are designated "New V.X(Y) where X is the table identifier and Y is a sequential number for lines in that table. Where the same line-item is proposed in multiple tables, the other tables are listed below the designation.

2. **General Comment 2 (GC2) for Stainless Steel in Treated Borated Water:** Neither the 2001 version of the GALL Report nor the January 2005 draft revision address the aging effect of loss of material for stainless steel in a treated borated water environment. Some sections of GALL note that the effect is minor and specifically not mentioned in GALL. For example, the introductory text to table IV.C2 says: The effects of pitting and crevice corrosion on stainless steel components are not significant in treated borated water and, therefore, are not included in this section.

   NEI pointed out that operating experience has shown loss of material to be a negligible effect because the water chemistry requirements minimize contaminants that would lead to loss of material. In other words, the water chemistry programs for PWRs manage the aging effect of loss of material. Although the effect is minor, past applications have listed (and future applications will list) loss of material as an aging effect for stainless steel in a treated borated water environment with water chemistry as the aging management program. Because the aging effect is minor, the water chemistry program by itself is sufficient to manage this aging effect, as evidenced by past operating experience.

   This was acknowledged in previous SERs including the following excerpt from Farley SER Section 3.1.2.3.1.2, *Pitting corrosion and crevice corrosion may occur in ASME Code, Class 1, stainless steel or NiCrFe components under exposure to aggressive, oxidizing environments. Normally, the presence of elevated dissolved oxygen and/or aggressive ionic impurity concentrations is necessary to create these oxidizing environments in the RCS. The applicant's response to RAI 3.1.3.1.1-1, Part b, provides an acceptable explanation for citing the Water Chemistry Control Program as a basis for minimizing the dissolved oxygen and ionic impurity concentrations that could otherwise, if left present in high concentrations, lead to an aggressive, oxidizing RCS coolant environment. The GALL Report does not indicate that the loss of material due to pitting corrosion or crevice corrosion is an aging effect of concern for stainless steel or NiCrFe ASME Code Class 1 components. Since the applicant has conservatively assumed that the loss of material due to pitting corrosion or crevice corrosion is an applicable aging effect for these RV components, the staff concludes that the Water Chemistry Control Program provides a sufficient mitigative strategy for managing this aging effect relative to the recommendations of the GALL Report.*

   NEI proposed new lines for systems where this MEAP is appropriate. The introductory text indicating the effect is not addressed is deleted.

3. **General Comment 3 (GC3) Water Chemistry Reference:** NEI pointed out that the reference to the specific EPRI document need not be included in the Aging Management Program column. This information is identified in the AMP description in Chapter XI of GALL.

4. **General Comment 4 (GC4) External Environments:** NEI commented that the introductory text to Chapter V systems tables refers to an external surfaces table H at the end of the chapter for aging management programs for the degradation of external surfaces of components and miscellaneous bolting. However, many external surfaces and external bolting entries are still within the individual systems tables. NEI proposed to move most external surface and external bolting lines to the external table. Any lines which refer to a unique aging management program (e.g., Fire Protection Program to monitor fire doors) would remain with the system table.

5. **General Comment 5 (GC5) Heat Exchanger Components Description:** NEI noted that many GALL items referring to heat exchanger components indicate whether the line-item applies to the tube side or the shell side. However, the designation of the tube side or shell side of a heat exchanger unnecessarily limits the applicability of the GALL line-item. Small heat exchangers in particular can be configured with the cooled fluid on either the shell or tube side. For heat exchangers with a given set of materials and environments, the configuration of the heat exchanger (tube side vs. shell side) will not alter the aging effects or the aging management programs. Consequently, the component descriptions for these lines should be changed to delete the tube side or shell side designation. Similarly, some lines list heat exchanger components including tubes. For aging effects other than the reduction of heat transfer, tubes may be considered with other heat exchanger components. Thus, for aging effects other than reduction of heat transfer, the component description should be “Heat exchanger components.” The descriptor “Heat exchanger tubes” should be used when addressing reduction of heat transfer.

6. **General Comment 6 (GC6) Bolting:** NEI suggested that, consistent with its Chapter IX comment, high strength low alloy steel should be ‘Low alloy steel.’ Also, bolt strength does not impact the fatigue or wear aging mechanisms.

   NEI further said that, although some utilities have conservatively applied loss of preload as aging effect for bolting, the industry does not consider loss of preload as an aging effect requiring management. In accordance with EPRI 1003056, “Mechanical Tool,” Appendix F, loss of preload is a design driven effect and not an aging effect requiring management. The bolting at most facilities is standard grade B7 carbon steel, or similar material, except in rare specialized applications. Loss of preload due to stress relaxation (creep) for this material can only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code Section II Part D Table 4 Note 4. However, there is no bolting used in BWRs and PWRs that operate at 700°F, with the exception of unique applications, such as the emergency diesel generator exhaust. Therefore, loss of preload due to stress relaxation (creep) is not a valid aging effect.

   In addition, NEI stated that the industry has taken actions to address NUREG –1339, “Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants.” Licensees have implemented good bolting practices in accordance with those referenced in EPRI NP-5769, EPRI NP-5067, and EPRI TR-104213 in normal maintenance and design activities. Normal maintenance and design activities thus address the potential for loss of preload such that it is not a concern for the current or extended operating term. Proper joint preparation and make-up in accordance with industry standards precludes loss of preload. Even other design factors that could contribute to a loss of preload in closure bolting applications, such as vibration, should not result in loosening in a properly designed and assembled bolted joint.

NEI suggested that he impact to the GALL tables is that, with elimination of loss of preload as an aging effect, closure bolting has the same MEAP as external surfaces and the lines could be combined.

7. **General Comment 7 (GC7) Integration of CASS with Stainless Steel**: NEI noted that cast austenitic stainless steel (CASS) is currently treated as a separate material in GALL. However, with the exception of the loss of fracture toughness due to thermal and neutron irradiation embrittlement, CASS and stainless steel share the same aging effects/mechanisms in GALL.

To simplify GALL, NEI recommended that CASS should be treated as a subset of stainless steel. CASS would only be listed as a material when loss of fracture toughness due to thermal (or thermal and irradiation) embrittlement is at issue, or where unique AMP requirements are given. This would provide consistency with GALL's treatment of other material groups, e.g., gray cast iron as a subset of steel, and copper alloy >15% zinc as a subset of copper alloy. Gray cast iron and copper alloy >15% zinc are both susceptible to selective leaching and are only listed as materials when selective leaching is addressed.

This change has the added benefit of eliminating the need for new MEAP combinations to address CASS in non-Class 1 systems where stainless steel is adequately evaluated but CASS, if it is to be considered a separate material, is not. CASS is currently listed in only a few lines in Chapters V and V and not at all in Chapter VI.

The changes required in GALL Chapter V are listed below. Each of these lines list CASS alone, and an identical line-item exists in the system table for stainless steel, so the CASS line-item may be deleted.

This page intentionally left blank.

Table A.2.5: Disposition of NEI Comments on Chapter VI of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G.VI-A-1	LP-07	NEI commented for high voltage insulators, "Degradation of insulation quality due to presence of any salt deposits and surface contamination" is a condition that can be caused in a matter of hours under the right environmental condition rather than an aging effect that changes the long-term physical properties of high voltage insulators.	NEI states that the NRC has issued 13 SERs covering 26 reactors with out requiring any one of them to have a single program for managing aging effects for high voltage insulators. NEI states that operating experience has not reported any adverse conditions.	The staff determined that a large buildup of contamination enables the conductor voltage to track along the surface more easily and can lead to insulator flashover. Surface contamination can be a problem in areas where greater concentrations of airborne particles at facilities that discharge soot or near the sea coast where salt spray is prevalent. However, staff agreed to modify the AMP column of the GALL Table VI.A, item LP-07 to state as follows: "A plant-specific aging management program is to be evaluated for plants located where the potential exists for salt deposits or surface contamination (e.g., in the vicinity of salt water bodies or industrial pollution)."
G.VI-A-2	LP-11	NEI recommends the deletion of aging effect/aging mechanism as listed for high voltage insulators.	NEI states that there has been no operating experience to support this aging effect.	The staff did not agree with this comment because mechanical wear is an aging effect for strain and suspension insulators in that they are subject to movement. Movement of the insulators can be caused by wind blowing the supported transmission conductor, causing it to swing from side to side. If this swinging is frequent enough, it could cause wear in the metal contact points of the insulator string and between an insulator and the supporting hardware. The GALL Report was not revised to address this proposed change.
G.VI-A-3	LP-04 LP-05	NEI recommends the use of "Metal-Enclosed Bus" instead	NEI recommends the change in name to differentiate them from out	The staff agreed with the definition.

Table A.2.5: Disposition of NEI Comments on Chapter VI of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	LP-06 LP-10	of bus ducts to denote electrical bus.	side enclosures around the electrically conducting bus bar, its supports, and insulating assemblies	The GALL Report was revised to address this proposed change.
G.VI-A-4	LP-08 LP-09	NEI stated that industry has not identified any aging effects for transmission conductors and connections, and for switchyard bus and connections.	NEI states that the NRC has issued 13 SERs covering 26 reactors with out requiring any one of them to have a single program for managing aging effects on transmission conductors and connections, and switchyard bus and connections. An aging management program is not needed for this component based on previously approved staff positions along with operating experience and testing that has demonstrated greater than an 80-year service life.	The staff did not agree with this comment because transmission conductor vibration could be caused by wind loading. Also, bolted connections can loosen due to thermal cycling. EPRI TR-104213, “Bolted Joint Maintenance & Applications Guide” recommends inspection of bolted joints for evidence of overheating, signs of burning or discoloration and indication of loose bolts. It recommends checking the joint resistance of bolted joints using a low range ohm meter. Lastly, the applicability of Ontario Hydra’s test of ACSR conductor is determined to be applicable on a plant-specific basis. The GALL Report was not revised to address this proposed change.
G.VI-A-5	LP-12	Cable connection metallic parts – NEI recommends deleting the AMP XI.E6, “Electrical Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”	This is a proposed AMP that has not been published previously, has not been proposed in a draft or final ISG, and has not been required for any previously approved license renewal application. This AMP should be eliminated as these items either have no aging effects requiring management or are adequately covered by other AMPs. Operating experience does not indicate a need for this proposed program.	The staff did not agree with this comment because SAND 96-0344, “Aging Management Guidelines For Electrical Cable and Terminations,” identified loosened terminations at several plants. Additionally, EPRI TR-104213 recommends inspection of bolted joints for evidence of overheating, signs of burning or discoloration and indication of loose bolts. It recommends checking the joint resistance of bolted joints using a low range ohmmeter. GALL AMP XI.E1 manages the aging of insulating materials but not the metallic parts of the electrical

Table A.2.5: Disposition of NEI Comments on Chapter VI of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				connections, which is the subject of this new AMP. The GALL Report was not revised to address this proposed change.
G.VI-A-6	LP-01	Fuse holders – NEI recommends deleting the AMP XI.E5, "Fuse Holders."	A new aging management program is proposed to monitor fuse holders as a special type of terminal block. Fuse holders and terminal blocks are already covered in XI.E1, "Electrical Cables and Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements," and listed in NUREG-1800, Table 2.1.5, Item 77, page 2.1-22 as part of the commodity group "Cables and Connections, Bus, Electrical portions of Electrical and I&C Penetration Assemblies." There should not need to be a special program for a specific type of a subcomponent of another AMP, if that program adequately covers the subcomponent. Most fuse holders are a subcomponent of active equipment and not subject to aging management review. Since no fuse holder aging management program has previously been required for nuclear plants with renewed licenses, there should be provisions for a licensee to show that the materials and	The staff did not agree with this comment because GALL AMP XI.E1 covers insulation in an adverse environmental condition only. ISG-5 included the need for an AMR and a new AMP. A new AMR row and a new AMP were included in the Jan'05 GALL. The GALL Report was not revised to address this proposed change.

Table A.2.5: Disposition of NEI Comments on Chapter VI of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			environments for fuse holders do not produce stressors that cause aging effects requiring management and an AMP is therefore not required. One example of these conditions would be a fuse panel installed to the manufacturer's specifications in a dry environment without sources of water in the vicinity, with both normal and peak loadings less than the rated amperage for the fuse at the design voltage and the fuses are not routinely removed for circuit isolation purposes.	

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-VII-GC-1a	AP-73	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of loss of material/ pitting and crevice corrosion for stainless steel piping, piping components, and piping elements in a sodium pentaborate solution environment. NEI recommended by NEI was Chapter XI.M2, "Water Chemistry," for PWR primary water.	NEI stated that the sodium pentaborate solution will effectively be treated water. Sodium pentaborate solution is relatively benign for stainless. As for other cases of stainless steel in treated water (e.g., A-58) loss of material is a possible aging effect (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The appropriate AMPs to use are GALL AMPs GALL XI.M2 and XI.M32 for this material, environment, aging effect, program (MEAP) combination based on similar rows in GALL (e.g., A-59). GALL AMP XI. M2 can be credited for corrosion as well as stress corrosion cracking The GALL Report was revised to address this proposed change.
G-VII-GC-1b	AP-74	(a) NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of loss of material/ pitting and crevice corrosion of aluminum piping, piping components, and piping elements in a condensation environment. The aging management program recommended by NEI was a plant-specific program. b) NEI also proposed a similar new row for the external surfaces of the ventilation systems in Chapter VII of GALL, and also recommended that microbiologically influenced corrosion be added to the aging effect/mechanism column and that the AMP	NEI stated that an approved precedent exists for this MEAP Combination. ANO-2 SER Section 3.3.2.3.11 acknowledges that aluminum components in a condensation environment are subject to loss of material. Aluminum may be used in HVAC systems where condensation is a possible environment. It is typical that the condensation would be on the outside (see also the endnotes to this table for NEI's presentation of general comment 1).	(a) The staff agreed with this comment. This line-item is similar to line-items AP-38, EP-26, and SP-24 which address loss of material for aluminum in a treated water environment, in that the condensation environment is frequently wetted. The aging mechanisms listed in this line-item do not include general corrosion, since aluminum is not subject to general corrosion even in treated water. A plant-specific program will manage the loss of material for these components. (b) AP-74 does apply to the ventilation systems in Chapter VII of GALL. The staff did not change the plant-specific program because this MEAP combination applies to more than external surfaces. The GALL Report was revised to address this proposed change.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		changed to the External Surfaces Monitoring Program.		
G-VII-GC-1c	AP-75 AP-76	NEI recommended the creation of new AMR line-items for the aging effects and mechanisms of hardening and loss of strength/elastomer degradation and loss of material/ erosion of elastomers in a raw water environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that the D.C. Cook SER Section 3.3.2.3.2 acknowledged the potential for a change of material properties for elastomeric components exposed to a raw water environment in the open cycle cooling water system. Loss of elastomer material would be addressed by a plant-specific program (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. However, consistent with the Cook SER, the AMP column was revised to read: Chapter XI.M20, "Open-Cycle Cooling Water System." This was accepted by the staff in the D.C. Cook SER Section 3.3.2.1.2. The GALL Report was revised to address this proposed change.
G-VII-GC-1d	AP-77	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of reduction of heat transfer/fouling for steel heat exchanger tubes in a closed cycle cooling water environment. NEI recommended Chapter XI.M21, "Closed-Cycle Cooling Water System."	NEI stated that fouling is an aging effect requiring management for heat exchanger tubes in a closed cycle cooling water environment (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. This row is similar to other GALL rows (e.g., AP-63) except that the material is steel versus stainless steel. GALL AMP XI.M21, "Closed-Cycle Cooling Water System is appropriate for this application." The GALL Report was revised to address this proposed change.
G-VII-GC-1e	AP-78	NEI recommended the creation of a new AMR line-items for the aging effects and mechanisms of loss of material/pitting and crevice corrosion for copper alloy piping, piping components, and piping elements in a condensation environment. The aging management program	NEI stated that an approved precedent exists for this MEAP combination. GALL row A-46 addresses copper alloy components in a condensation (external) environment. This proposed row is the same as A-46 except the condensation is on the internal surface of the	The staff agreed with this comment. The staff agrees that an internal condensation environment can exist in the fire protection system and that this row is similar to GALL row A-46 except that the condensation is on the internal surface of the component. A plant-specific program will manage the loss of material for these components.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		recommended was a plant-specific program.	component in the fire protection system (see also the endnotes to this table for NEI's presentation of general comment 1).	The GALL Report was revised to address this proposed change.
G-VII-GC-1f	AP-80	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of reduction of heat transfer/fouling for copper alloy heat exchanger tubes in a closed cycle cooling water environment. NEI recommended Chapter XI.M21, "Closed-Cycle Cooling Water System."	NEI stated that fouling is an aging effect requiring management for heat exchanger tubes in a closed cycle cooling water environment (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. This row is similar to AP-34 and AP-65 except that the aging effect of reduction of heat transfer was to account for the internal environment of the tubes. GALL AMP is XI.M21, "Closed-Cycle Cooling Water System, is appropriate for this application." The GALL Report was revised to address this proposed change.
G-VII-GC-1g	AP-81	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of loss of material/ pitting and crevice corrosion of stainless steel piping, piping components, and piping elements in a condensation environment. The aging management program recommended by NEI was a plant-specific program.	NEI stated that this new row is the same as AP-72. It addresses stainless steel used in compressed air systems (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff agreed that this row is identical to AP-72 with the exception that AP-72 applies to Non-Safety Related Category (A)(2) Systems and was deleted when the corresponding section was deleted whereas AP-81 applies only to the Compressed Air Systems. Thus, the plant-specific AMP for AP-81 was replaced with GALL AMP XI.M24, "Compressed Air Monitoring." AMR line-item AP-72 was deleted when the section (VII K) in which it was located, "Non-Safety Related Category (A)(2) Systems," was deleted in response to advise during the public comment period. The GALL Report was revised to address this proposed change.
G-VII-GC-1h	AP-82	NEI recommended the creation of a new AMR line-item for the	NEI stated that this row is identical to E-12 in Chapter V of	The staff agreed with this comment. The staff agreed that this row is identical to E-

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		aging effects and mechanisms of cracking/stress corrosion cracking for stainless steel piping, piping components, piping elements, and tanks in a treated water environment. NEI recommended Chapter XI.M2, “Water Chemistry,” for PWR primary water.	GALL and it should also be added to the PWR Chemical and Volume Control System (see also the endnotes to this table for NEI’s presentation of general comment 1).	12 in GALL Chapter V and it should also be added to the PWR Chemical and Volume Control System. GALL AMP XI.M2, “Water Chemistry,” for PWR primary water is appropriate for this application. The GALL Report was revised to address this proposed change.
G-VII-GC-1i	AP-83	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of loss of material/ pitting and crevice corrosion for aluminum piping, piping components, and piping elements in a raw water environment. NEI recommended Chapter XI.M26, “Fire Protection.”	NEI stated that the Farley SER Section 3.3.2.3.13 for the fire protection system acknowledges (by reference to Table 3.3.2-13 of the Farley LRA) that aluminum components in a raw water environment are subject to loss of material which can be managed by the fire protection program. This line-item is similar to lines AP-38, EP-26, and SP-24 which address loss of material for aluminum in a treated water environment. The aging mechanisms listed in this line-item do not include general corrosion; since aluminum is not subject to general corrosion even in treated water (see also the endnotes to this table for NEI’s presentation of general comment 1).	The staff agreed with this comment. The staff agreed that a precedent exists for adding this AMR line-item for the fire protection system for aluminum components in a raw water environment that are subject to loss of material, GALL AMP XI.M26, “Fire Protection” is appropriate for this application. The GALL Report was revised to address this proposed change.
G-VII-GC-1j	A-35	NEI recommended that VII.E3 also be added to A-35 for BWR reactor water cleanup systems	NEI stated that steel exposed to a BWR primary water environment is possible in the BWR reactor water cleanup	The staff agreed with this comment. The staff agreed that this AMR line-item should also be extended to the BWR reactor water cleanup system.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			system. This material and environment combination was by the NRC in the Dresden/Quad Cities SER Section 3.3.2.4.4 (see also the endnotes to this table for NEI's presentation of general comment 1)	The GALL Report was revised to address this proposed change.
G-VII-GC-1k	New VII.G(2) and H(2)	NEI recommended the creation of a new AMR line-items for the aging effects and mechanisms of loss of material/pitting and crevice corrosion for aluminum piping, piping components, and piping elements in a diesel exhaust environment. The aging management program recommended was a plant-specific program.	NEI stated that ANO-2 SER Section 3.3.2.3.4 for the alternate AC diesel generator system acknowledges (by reference to Table 3.3.2-4 of the ANO-2 LRA) that aluminum components in a diesel exhaust environment are subject to loss of material. Aluminum would be subject to pitting and crevice corrosion in this environment. This line-item is applied to aluminum components in the exhaust systems of the fire protection diesel generators and emergency diesel generators. The aging effects for these components will be managed by a plant-specific program (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff did not agree with this comment. Aluminum is typically not used in a high temperature environment. Thus, this proposed new AMR line-item appears to be plant-specific and not a generic MEAP combination. The GALL Report was not revised to address this proposed change.
G-VII-GC-1l	New VII.G(3)	NEI recommended the creation of a new AMR line-items for the Fire Protection System for the aging effects and mechanisms of loss of material/pitting and crevice corrosion for steel	NEI stated that GALL rows E-27 and AP-71 already address this combination of material, environment, aging effect, and aging management program for other systems. This line-item	The staff agreed with this comment. Due to the changes that were made to A-23 as a result of another NEI comment (G-VII-C-1), AP-71 was deleted and A-23 was revised to extend the applicability of this GALL row to the fire protection system.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		piping, piping components, and piping elements in a condensation environment. The aging management program recommended was a plant-specific program.	addresses the same material and environment combination which can exist in the fire protection system (see also the endnotes to this table for NEI's presentation of general comment 1)	The GALL Report was revised to address this proposed change.
G-VII-GC-1m	New VII.H2(1)	NEI recommended the creation of a new AMR line-items for the aging effects and mechanisms of loss of material/pitting and crevice corrosion for stainless steel piping, piping components, and piping elements, and tanks in a condensation environment. The aging management program recommended was a plant-specific program.	NEI stated that starting air systems on the diesel engines may contain moist (but filtered) air. NEI stated that the Farley nuclear plant has several instances of this condition (see also the endnotes to this table for NEI's presentation of general comment 1),	The staff did not agree with this comment. The staff believes this material in this environment is not generically present in the emergency diesel generator system. A similar row was added to the Compressed Air Systems (AP-81, see G-VII-GC-1g) where GALL AMP XI.M24 could be used, however, this AMP is not applicable to the new row that was proposed. The GALL Report was not revised to address this proposed change.
G-VII-GC-2	AP-79	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of loss of material/ pitting and crevice corrosion for stainless steel and stainless steel cladding piping, piping components, and piping elements in a treated borated water environment. NEI recommended Chapter XI.M2, “Water Chemistry,” for PWR primary water.	Pitting and crevice corrosion may occur in ASME Code Class 1 stainless steel components under exposure to aggressive, oxidizing environments. Because the aging effect is minor, the water chemistry program by itself is sufficient to manage this aging effect, as evidenced by past operating experience (precedent based on Farley SER Section 3.1.2.3.1.2, and applicant's response to RAI 3.1.3.1.1-1) (see also the endnotes to this table for NEI's presentation of general comment 2)	The staff agreed with this comment. Loss of material due to pitting and crevice corrosion is managed by water chemistry requirements. The AMP specification is XI.M2, “Water Chemistry,” for PWR primary water. A new AMR line-itemAP-79 was created. The GALL Report was revised to address this proposed change.
G-VII-GC-3a	A-35	NEI recommended deletion of	NEI stated that the reference to	The staff agreed with this comment.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	A-40 A-58 A-59 A-61 A-96	the reference to EPRI document TR103515 from the AMP column in the line-items.	this specific EPRI document need not be included in the line-item AMP column because this information is provided in GALL AMP XI.M2, Within the AMR line-items, it is adequate and internally consistent simply to reference AMP XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515) as GALL AMP XI.M2, "Water Chemistry," for BWR water (see also the endnotes to this table for NEI's presentation of general comment 3).	Previously, BWRVIP-29 (EPRI TR-103515) was referenced in the AMP column of the AMR line-items. The AMP column was revised to read: "Chapter XI.M2, Water Chemistry, for BWR water." The GALL Report was revised to address this proposed change.
G-VII-GC-3b	A-39 A-56 A-84 A-97 AP-82	NEI recommended deletion of the reference to EPRI document TR105714 from the AMP column in the line-items.	NEI stated that the reference to this specific EPRI document need not be included in the line-item AMP column because this information is provided in AMP Chapter XI.M2. Within the AMR line-items, it is adequate and internally consistent simply to reference AMP XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-105714 as Chapter XI.M2, "Water Chemistry," for PWR secondary water (see also the endnotes to this table for NEI's presentation of general comment 3).	The staff agreed with this comment Previously, EPRI TR-105714 was referenced in the AMP column of the AMR line-items; AMP column was revised to read: "Chapter XI.M2, Water Chemistry for PWR primary water." The GALL Report was revised to address this proposed change.
G-VII-GC-4	A-01 A-02 A-05 A-07 A-09	NEI recommended deletion of the line-items that address the external surfaces of components and bolting from the applicable systems table and move them to	NEI stated that the appropriate location for line-items that address external surfaces is for all to be co-located in the new external surfaces aging	The staff noted that it was important for its reviewers to know to what system each line-item belonged; this information was important and useful in performing its reviews to know which specific systems

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	A-10 A-23 A-24 A-46 A-73 A-77 A-79 A-78 A-80 A-94 A-95 A-103 A-104 A-105 AP-01 AP-42	a new external surfaces aging management program table. NEI proposed to add this AMP "External Surfaces Monitoring."	management program table rather than within their applicable system tables, but that line-items that refer to a unique aging management program, e.g., the fire protection program, which monitors fire doors, should remain with the appropriate systems table (see also the endnotes to this table for NEI's presentation of general comment 4).	are addressed by which line-items. The staff thus decided that it was more beneficial to the reviewer to include each line-item is in its appropriate system than to group these components by the surface to be examined. The GALL Report was not revised to address this proposed change. However, for A-02, general corrosion was removed from the AE/M because it is already covered under A-01 and the AMP in this row (A-02) did not provide for general corrosion management. Also, the staff extended the applicability to H1 and H2, and deleted AP-42 (which was duplicative with A-02). For A-10, A-24, A-80, A-105 the AMP was changed to the new AMP XI.M36, "External Surfaces Monitoring" program.
G-VII-GC-5	A-100 A-63 A-64 A-65 A-66 A-67 A-68 A-69 A-70 A-71 A-84 A-85 AP-34 AP-39	NEI recommended deletion of the references to reactor type and to heat exchanger shell and tube side components, as appropriate.	NEI stated that many GALL items referring to heat exchanger components indicate whether the line-item applies to the tube side or the shell side. However, the designation of the tube side or shell side of a heat exchanger unnecessarily limits the applicability of the GALL line-item. Small heat exchangers in particular can be configured with the cooled fluid on either the shell or tube side. For heat exchangers with a	The staff agreed that the aging effects and aging programs are applicable to the component, regardless of heat exchanger design, (i.e., of either shell or tube side) thus, it was appropriate to include both sides, not just one. (Note: As a result of these changes, row A-85 was deleted because it was identical to A-71) The GALL Report was revised to address this proposed change.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	AP-40 AP-41 AP-65		given set of materials and environments, the configuration of the heat exchanger (tube side vs. shell side) will not alter the aging effects or the aging management programs. Consequently, the component descriptions for these lines should be changed to delete the tube side or shell side designation (see also the endnotes to this table for NEI's presentation of general comment 5).	
G-VII-GC-6	AP-26	NEI recommended the deletion of this AMR line-item.	NEI stated that loss of preload is not an aging effect (see also the endnotes to this table for NEI's presentation of general comment 6).	The staff agreed that loss of preload due to stress relaxation (creep) can only be a concern in very high temperature applications (> 700°F). In EPRI TR-104213 and EPRI NP-5067, loss of preload due to gasket creep, thermal effects (including differential expansion and creep or stress relaxation), and self-loosening (which includes vibration, joint flexing, cyclic shear loads, thermal cycles) is discussed. The staff determined that this combination of aging mechanisms will replace 'stress relaxation.' Thus the replacement aging effect/aging mechanism will be loss of preload/ thermal effects, gasket creep, and self-loosening. The GALL Report was modified to address this comment.
G-VII-GC-7	A-101	NEI recommended the deletion	NEI stated that cast austenitic	The staff agreed with this comment. A-

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	A-41 A-42 AP-7	of these line-items.	stainless steel is addressed by other GALL rows for stainless steel	101, A-41, and A-42 are enveloped by A-61, A-60, and A-62, respectively. The GALL Report was revised to address this proposed change.
G-VII-C-1	A-23	NEI recommended changing the environment from Moist air to Condensation (internal) to reflect moisture in the emergency diesel starting air system.	NEI stated that the aging effects are the same for both environments and the definition in Chapter IX says the two environments are similar.	The staff agreed with this comment. As a result of this change, the staff determined that AP-71 was identical to A-23. Thus, AP-71 was deleted and the related items column of A-23 was revised to make it applicable to the same systems as AP-71. The AMP column was also revised to read: Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components." The GALL Report was revised to address this proposed change.
G-VII-C-2	A-32 AP-25	NEI recommended the deletion of this AMR line-item.	NEI stated that this item is addressed under item VII.C1-20 (A-38).	The staff agreed with this comment. The related item rows for A-32 and AP-25 were transferred to the related items column for A-38. The materials column for A-38 was also revised to indicate that this may be steel with or without lining/coating. The aging effect/mechanism column was also revised to add "and lining/coating degradation" similar to rows A-39 and A-40. The GALL Report was revised to address this proposed change.
G-VII-C-3	A-50	NEI recommended deleting pitting and crevice corrosion from the AERM. Correspondingly, NEI recommended that XI.M21,	NEI noted that row A-25 includes general, pitting and crevice corrosion for steel which includes gray cast iron for these mechanisms.	The staff agreed with this comment. The staff agreed that this AMR line-item should only address selective leaching since the aging mechanisms of general, pitting and crevice corrosion are

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		"Closed-Cycle Cooling Water System," be deleted from the AMP column.		addressed in A-31. The GALL Report was revised to address this proposed change. Also, this row is similar to AP-31; thus, F3 (PWR Steam Generator Blowdown System) was added to the related item column to address the NEI comment (see G-VII-C-9) to change the environment to closed cycle cooling water.
G-VII-C-4	AP-57 (deleted following the public comment period)	NEI recommended that the reference to C2 in the related item column be deleted.	NEI stated that closed cycle cooling water environment is associated with use of GALL AMP XI.M.21, "Closed-Cycle Cooling Water System"; therefore, it is already covered by VII.C2-9 (A-52).	The staff agreed with this comment. The staff agreed that this AMR line-item should not apply to VII.C2, "Closed-Cycle Cooling Water System," since this addressed in A-52. Thus the AMR line-item AP-57 was deleted following the public comment period. The GALL Report was revised to address this proposed change.
G-VII-C-5	A-59	NEI recommended to add ">60°C (>140°F)" at the end of the environment column.	NEI stated that sodium pentaborate solution is relatively benign for stainless. Water chemistry controls will assure contaminants are minimized so >140 F temperature threshold for cracking is applicable.	The staff agreed with this comment. The staff agreed that this temperature threshold is appropriate for cracking to occur. The GALL Report was revised to address this proposed change.
G-VII-C-6	A-90	NEI recommend deleting freeze-thaw from the aging effect/mechanism column.	NEI stated that freeze-thaw is not possible in an Air - indoor uncontrolled environment.	The staff agreed with this comment. The staff agreed that freeze-thaw is not possible in an air-indoor uncontrolled environment. The GALL Report was revised to address this proposed change.
G-VII-C-7	AP-64	NEI recommended that the	NEI noted that that environment	The staff agreed with this comment.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		reference to C2 in the related item column be deleted.	for VII.C2 should be closed cycle cooling water not treated water. Therefore, this row is duplicative to AP-12.	The staff agreed that the closed cycle cooling water AMP be deleted from this line-item because the environment is treated water. Thus, the staff deleted VII.C2, “Closed-Cycle Cooling Water System”; from the related field because it is associated with closed cycle cooling, which is covered by AP-12. No change to AP-12 was required. The appropriate AMP description is Chapter XI.M2, “Water Chemistry,” for BWR water. The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program. The GALL Report was revised to address this proposed change.
G-VII-C-8	AP-29 (deleted following the public comment period)	NEI recommended that the environment for this row be changed from untreated water to raw water.	NEI stated that this change is consistent with the environment for other GALL rows in the fire protection system.	The staff agreed with this comment. The staff revised the environment from untreated water to raw water to be consistent with the terminology for this fluid system throughout the GALL Report. The AMR line-item AP-29 was deleted since it is now duplicative of A-51. The GALL Report was revised to address this proposed change.
G-VII-C-9	AP-31	NEI recommended that the environment for this row be changed to closed cycle cooling water for related item F3 only (Primary Containment Heating and Ventilation System).	NEI stated that this environment is consistent with other steel environments.	The staff agreed with this comment. Related item F3 was moved to A-50 since this row addresses closed cycle cooling water for the same material and aging effect/mechanism as AP-31.

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				The GALL Report was revised to address this proposed change.
G-VII-C-10	AP-35 AP-44	NEI recommended deleting Chapter XI.M32, “One-Time Inspection,” from the AMP column.	NEI stated that If a chemistry program meets GALL then water is not allowed to accumulate and aging effect will not occur. Thus, NEI believes that that there is no need for a One-Time Inspection.	The staff did not agree with this comment. GALL AMP XI.M30 does not contain any requirements to verify the absence of water; thus this program is required to be supplemented by XI.GALL AMP M32 consistent with other GALL rows. (Note: M32 was also added to GALL row AP-54) The GALL Report was not revised to address this proposed change.
G-VII-C-11	AP-44	NEI recommended deleting “(Water as a contaminant)” from the fuel oil environment.	NEI stated the use of the phrase (water as a contaminant) is confusing. NEI stated that it is not clear in Chapter IX or by this entry what the difference is and why this is needed. This phrase is rarely used and is not consistent.	The staff agreed with this comment. The staff agreed that the term “(Water as a contaminant)” is not needed since the definition of Fuel Oil in GALL Chapter IX notes that water contamination is possible. The GALL Report was revised to address this proposed change.
G-VII-C-12	AP-60	NEI recommended adding Chapter XI.M21, “Closed -Cycle Cooling Water System” to the AMP column for managing cracking.	NEI noted that in the Farley LRA, the Water Chemistry Control Program satisfies the recommendation of GALL AMP XI.M21 to manage cracking in stainless steel in this environment. This was by the NRC in Section 3.0.3.2.1 of the Farley SER.	The staff agreed with this comment. The AMP column was revised to read: “Chapter XI.M21 “Closed –Cycle Cooling Water System.” and no further evaluation is required. GALL AMP XI.M21 has also been revised to allow it to properly manage stress corrosion cracking. The GALL Report was revised to address this proposed change.
G-VII-C-13	New VII.J(1)	NEI recommended the creation of a new AMR line-item for the external surfaces of steel piping, piping components, and piping elements in a containment (inert)	NEI stated that this comment is similar to one they had on GALL Chapter IX on Containment environment (inert).	The staff did not agree with this comment. There are situations where the containment is not inerted, for example, during outages the environment is not inerted, and when inerted, leakage is

Table A.2.6: Disposition of NEI Comments on Chapter VII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		environment. NEI recommended no aging effect of aging management program for this new row.		allowed per the Technical Specifications. Potential exists for aging effects due to these conditions. The GALL Report was not revised to address this proposed change.

<u>**Endnotes Clarifying General Comments Provided by NEI**</u>

1. **General Comment 1 (GC1) for New AMR Line-Items:** NEI proposed new lines items are listed at the end of each table. The new lines are designated “New VII.X(Y) where X is the table identifier and Y is a sequential number for lines in that table. Where the same line-item is proposed in multiple tables, the other tables are listed below the designation.

2. **General Comment 2 (GC2) for Stainless Steel in Treated Borated Water:** Neither the 2001 version of the GALL Report nor the January 2005 draft revision address the aging effect of loss of material for stainless steel in a treated borated water environment. Some sections of GALL note that the effect is minor and specifically not mentioned in GALL. For example, the introductory text to table IV.C2 says: The effects of pitting and crevice corrosion on stainless steel components are not significant in treated borated water and, therefore, are not included in this section.

   NEI pointed out that operating experience has shown loss of material to be a negligible effect because the water chemistry requirements minimize contaminants that would lead to loss of material. In other words, the water chemistry programs for PWRs manage the aging effect of loss of material. Although the effect is minor, past applications have listed (and future applications will list) loss of material as an aging effect for stainless steel in a treated borated water environment with water chemistry as the aging management program. Because the aging effect is minor, the water chemistry program by itself is sufficient to manage this aging effect, as evidenced by past operating experience.

   This was acknowledged in previous SERs including the following excerpt from Farley SER Section 3.1.2.3.1.2, *Pitting corrosion and crevice corrosion may occur in ASME Code, Class 1, stainless steel or NiCrFe components under exposure to aggressive, oxidizing environments. Normally, the presence of elevated dissolved oxygen and/or aggressive ionic impurity concentrations is necessary to create these oxidizing environments in the RCS. The applicant’s response to RAI 3.1.3.1.1-1, Part b, provides an acceptable explanation for citing the Water Chemistry Control Program as a basis for minimizing the dissolved oxygen and ionic impurity concentrations that could otherwise, if left present in high concentrations, lead to an aggressive, oxidizing RCS coolant environment. The GALL Report does not indicate that the loss of material due to pitting corrosion or crevice corrosion is an aging effect of concern for stainless steel or NiCrFe ASME Code Class 1 components. Since the applicant has conservatively assumed that the loss of material due to pitting corrosion or crevice corrosion is an applicable aging effect for these RV components, the staff concludes that the Water Chemistry Control Program provides a sufficient mitigative strategy for managing this aging effect relative to the recommendations of the GALL Report.*

   NEI proposed new lines for systems where this MEAP is appropriate. The introductory text indicating the effect is not addressed is deleted.

3. **General Comment 3 (GC3) Water Chemistry Reference:** NEI pointed out that the reference to the specific EPRI document need not be included in the Aging Management Program column. This information is identified in the AMP description in Chapter XI of GALL.

4. **General Comment 4 (GC4) External Environments:** NEI commented that the introductory text to Chapter VII systems tables refers to an external surfaces table H at the end of the chapter for aging management programs for the degradation of external surfaces of components and miscellaneous bolting. However, many external surfaces and external bolting entries are still within the individual systems tables. NEI proposed to move most external surface and external bolting lines to the external table. Any lines which refer to a unique aging management program (e.g., Fire Protection Program to monitor fire doors) would remain with the system table.

5. **General Comment 5 (GC5) Heat Exchanger Components Description:** NEI noted that many GALL items referring to heat exchanger components indicate whether the line-item applies to the tube side or the shell side. However, the designation of the tube side or shell side of a heat exchanger unnecessarily limits the applicability of the GALL line-item. Small heat exchangers in particular can be configured with the cooled fluid on either the shell or tube side. For heat exchangers with a given set of materials and environments, the configuration of the heat exchanger (tube side vs. shell side) will not alter the aging effects or the aging management programs. Consequently, the component descriptions for these lines should be changed to delete the tube side or shell side designation. Similarly, some lines list heat exchanger components including tubes. For aging effects other than the reduction of heat transfer, tubes may be considered with other heat exchanger components. Thus, for aging effects other than reduction of heat transfer, the component description should be “Heat exchanger components.” The descriptor “Heat exchanger tubes” should be used when addressing reduction of heat transfer.

6. **General Comment 6 (GC6) Bolting:** NEI suggested that, consistent with its Chapter IX comment, high strength low alloy steel should be ‘Low alloy steel.’ Also, bolt strength does not impact the fatigue or wear aging mechanisms.

   NEI further said that, although some utilities have conservatively applied loss of preload as aging effect for bolting, the industry does not consider loss of preload as an aging effect requiring management. In accordance with EPRI 1003056, “Mechanical Tool,” Appendix F, loss of preload is a design driven effect and not an aging effect requiring management. The bolting at most facilities is standard grade B7 carbon steel, or similar material, except in rare specialized applications. Loss of preload due to stress relaxation (creep) for this material can only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code Section II Part D Table 4 Note 4. However, there is no bolting used in BWRs and PWRs that operate at 700°F, with the exception of unique applications, such as the emergency diesel generator exhaust. Therefore, loss of preload due to stress relaxation (creep) is not a valid aging effect.

   In addition, NEI stated that the industry has taken actions to address NUREG –1339, “Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants.” Licensees have implemented good bolting practices in accordance with those referenced in EPRI NP-5769, EPRI NP-5067, and EPRI TR-104213 in normal maintenance and design activities. Normal maintenance and design activities thus address the potential for loss of preload such that it is not a concern for the current or extended operating term. Proper joint preparation and make-up in accordance with industry standards precludes loss of preload. Even other design factors that could contribute to a loss of preload in closure bolting applications, such as vibration, should not result in loosening in a properly designed and assembled bolted joint.

NEI suggested that the impact to the GALL tables is that, with elimination of loss of preload as an aging effect, closure bolting has the same MEAP as external surfaces and the lines could be combined.

7. **General Comment 7 (GC7) Integration of CASS with Stainless Steel**: NEI noted that cast austenitic stainless steel (CASS) is currently treated as a separate material in GALL. However, with the exception of the loss of fracture toughness due to thermal and neutron irradiation embrittlement, CASS and stainless steel share the same aging effects/mechanisms in GALL.

To simplify GALL, NEI recommended that CASS should be treated as a subset of stainless steel. CASS would only be listed as a material when loss of fracture toughness due to thermal (or thermal and irradiation) embrittlement is at issue, or where unique AMP requirements are given. This would provide consistency with GALL's treatment of other material groups, e.g., gray cast iron as a subset of steel, and copper alloy >15% zinc as a subset of copper alloy. Gray cast iron and copper alloy >15% zinc are both susceptible to selective leaching and are only listed as materials when selective leaching is addressed.
This change has the added benefit of eliminating the need for new MEAP combinations to address CASS in non-Class 1 systems where stainless steel is adequately evaluated but CASS, if it is to be considered a separate material, is not. CASS is currently listed in only a few lines in Chapters V and VII and not at all in Chapter VIII.

The changes required in GALL Chapter VII are listed below. Each of these lines list CASS alone, and an identical line-item exists in the system table for stainless steel, so the CASS line-item may be deleted.

This Page Intentionally Left Blank

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-VIII-GC-1a	SP-43 SP-44 SP-45 SP-46	NEI recommended the creation of a new AMR line-items for the aging effects and mechanisms of cracking and stress corrosion cracking, loss of material/pitting and crevice corrosion, of stainless steel piping, piping components, and piping elements in a steam environment. NEI recommended Chapter XI.M2, “Water Chemistry,” augmented by Chapter XI.M32, “One-Time Inspection.”	NEI stated that the aging effects and mechanisms of cracking and stress corrosion cracking of stainless steel piping, piping components, and piping elements in a steam environment were already included in the main steam system, as identified in line-item SP-45, SP-44, SP-46, and SP-43, respectively, and that it was appropriate to address components of the same MEAP combination that existed in the steam turbine (also see endnotes to this table for NEI’s presentation of general comment 1).	The staff agreed with this comment. The existing MEAP combinations noted by NEI were extended to cover the BWR and PWR steam turbine systems. The GALL Report was revised to address this proposed change.
G-VIII-GC-1b	SP-30 SP-31	NEI recommended the creation of new AMR line-items for the aging effects and mechanisms of loss of material/pitting, crevice and microbiologically influenced corrosion, and loss of material/selective leaching, of copper alloy piping, piping components, and piping elements in a raw water environment. NEI recommended Chapter XI.M20, “Open-Cycle Cooling Water System,” for loss of material/pitting, crevice and microbiologically influenced corrosion. This program implements the requirements of Generic Letter 89-13, “Service	NEI stated that components of these MEAP combinations addressed the exciter and the isophase bus coolers of the turbines. NEI stated that this GALL AMP XI.M20 (Generic Letter 89-13), is appropriate for both safety-related and non-safety-related applications, and that it also applies to water chemistry, as it is normally the service water system; the service water system aging management program is more comprehensive than Generic Letter 89-13. These new AMR line-items are the same as SP-31 and SP-30, respectively (also	The staff agreed with this comment. The existing MEAP combinations noted by NEI were extended to be included in VIII.A SPCS Steam Turbine System to cover the exciter coolers and the isophase bus coolers of the turbines. The GALL Report was revised to address this proposed change.

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		Water System Problems Affecting Safety-Related Equipment." For the aging effect/mechanism of loss of material/selective leaching, the recommended program is Chapter XI.M33, "Selective Leaching of Materials."	see endnotes to this table for NEI's presentation of general comment 1).	
G-VIII-GC-1c	SP-27 SP-28	NEI recommended the creation of new AMR line-items for the aging effects and mechanisms of loss of material/selective leaching of gray cast iron piping, piping components, and piping elements in treated and raw water environments. NEI recommended Chapter XI.M33, "Selective Leaching of Materials" for this application.	NEI stated that there is a need to address the selective leaching of gray cast iron. These new AMR line-items are the same as SP-27 and SP-28, respectively (also see endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The existing MEAP combinations noted by NEI were extended to cover the BWR and PWR steam turbine systems. However, the staff regarded the environment of "untreated water" to be inconsistent with line-items in other chapters. The staff changed this environment to "raw water," to be consistent throughout the GALL Report. The GALL Report was revised to address this proposed change.
G-VIII-GC-1d	S-23	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of loss of material/general, pitting, and crevice corrosion of steel heat exchanger components in a closed cycle cooling water environment. NEI recommended Chapter XI.M21, "Closed–Cycle Cooling Water System," for this application.	NEI stated that this new AMR line-item addressed the stator coolers, which had not been addressed. This line-item was the same as S-23 (also see endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment. The existing MEAP combinations noted by NEI were extended to cover the BWR and PWR steam turbine systems. The GALL Report was revised to address this proposed change.
G-VIII-GC-1e	SP-61	NEI recommended the creation of new AMR line-items for the aging effects and mechanisms of loss of material/general,	NEI stated that these new AMR line-items complimented the new AMR line-item VIII.F1 in that they addressed the loss of	The staff reviewed these components and agreed that, while the selective leaching of copper alloy piping, piping components, and piping elements had been addressed,

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		pitting, and crevice corrosion of copper alloy piping, piping components, and piping elements in a treated water environment. The NEI-recommended aging management program was Chapter XI.M2, “Water Chemistry.”	material of general, pitting, and crevice corrosion, in addition to selective leaching, which is already addressed, and which can apply to all copper alloys (also see endnotes to this table for NEI’s presentation of general comment 1).	the aging mechanisms of general, pitting, and crevice corrosion had not been addressed. However, NEI had recommended that no further evaluation be required. The staff disagreed with this assessment and decided that the detection of aging effects was to be evaluated. Further, the staff noted that there was no validation program. Thus, staff added a verification program to read: Chapter XI.M32, “One-Time Inspection,” is unacceptable verification program. The GALL Report was revised to address this proposed change.
G-VIII-GC-1f	SP-60	NEI recommended a new AMR line-item for the aging effects and mechanisms of loss of material/general, pitting, and crevice corrosion of the internals of steel piping, piping components, and piping elements in a condensation environment. The NEI-recommended aging management program was a plant-specific aging management program.	NEI stated that this new AMR line-item would address such components as steam piping that remains empty, when it in a standby condition. This piping would include AFW turbine steam lines during normal operation. MIC cannot occur here, as the water condenses from temperatures in excess of 212^{0}F. (also see endnotes to this table for NEI’s presentation of general comment 1).	The staff agreed with this comment with modification to cover steam piping that is empty in standby condition during normal operations, such as AFW turbine steam lines. The AMP column was revised to read: Chapter XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components” which is a new AMP developed to apply to manage aging on internal piping surfaces. The GALL Report was revised to address this proposed change.
G-VIII-GC-1g	S-09 S-10 SP-16 SP-17	NEI recommended the creation of new AMR line-items for the aging effects and mechanisms of cracking/stress corrosion cracking and loss of material/pitting and crevice corrosion, loss of material/ general, pitting, and crevice	NEI stated that this new AMR line-item was added to include the treated water environment that exists due to steam condensation from drain lines/drain pots, etc. This line-item is the same as SP-17, SP-16, S-10, and S-09 (also see	The staff agreed with this comment. The existing MEAP combinations noted by NEI were extended to cover the BWR and PWR main steam systems. The GALL Report was revised as described above to address this comment.

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		corrosion, of stainless steel and steel piping, piping components, and piping elements in a treated water environment. NEI recommended Chapter XI.M2, "Water Chemistry" for PWR secondary water, augmented by "Chapter XI.M32, "One-Time Inspection," for this application.	endnotes to this table for NEI's presentation of general comment 1).	
G-VIII-GC-1h	S-16	NEI recommended the creation of new AMR line-items for the aging effect and mechanism of wall thinning/flow-accelerated corrosion, of steel piping, piping components, and piping elements in a treated water environment. The aging management program recommended by NEI was "Chapter XI.M17, "Flow-Accelerated Corrosion," for this application	NEI stated that this new AMR line-item was added to include the treated water environment that exists due to steam condensation from drain lines/drain pots, etc. This line-item is the same as S-16 (also see endnotes to this table for NEI's presentation of general comment 1).	The staff did not agreed with this comment because the drain lines/pots, etc. are only exposed to low flow conditions. Thus, the potential for wall thinning/flow accelerated-corrosion does not exist. The GALL Report was not revised to address this proposed change.
G-VIII-GC-1i	SP-59	NEI recommended the creation of new AMR line-items for the aging effects and mechanisms of loss of material/ general, pitting, and crevice corrosion of steel piping, piping components, and piping elements internals in an outdoor air environment. NEI recommended GALL AMP XI.M32, "One-Time Inspection," for this application.	NEI stated that this new AMR line-item was added to include the interior surfaces of the main steam safety vents to atmosphere downstream of the safety valves. This line-item is similar to other lines with the combination of steel, outdoor air, and loss of material, such as line-item A-24. However, where line-item A-24 refers to a plant-specific program, this line-item uses a one time inspection (also see endnotes to this table for	The staff agreed with this comment with modification to cover the interior surfaces of the main steam safety vents to atmosphere downstream of safety valves. The AMP column was revised to read: "Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components." GALL AMP XI.M38 was developed to apply to manage aging on internal piping surfaces. The GALL Report was revised to address this proposed change.

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			NEI's presentation of general comment 1).	
G-VIII-GC-1j	SP-57	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of reduction of heat transfer/fouling of copper alloy heat exchanger tubes in a closed cycle cooling water environment. NEI recommended GALL AMP XI.M21, "Closed Cycle Cooling Water System," for this application.	NEI stated that this AMR line-item applies to any heat exchanger with closed cycle cooling water on either side of the heat exchanger tubes. It is similar to AP-63, but for a different material (also see endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment and agreed that the copper alloy heat exchanger tubes in a closed cycle cooling water environment could result in reduction of heat transfer. A new AMR line-item SP-57 was created The GALL Report was revised to address this proposed change.
G-VIII-GC-1k	SP-56	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of reduction of heat transfer/fouling of copper alloy heat exchanger tubes in a raw water environment. NEI recommended GALL AMP XI.M20, "Open Cycle Cooling Water," for this application.	NEI stated that this AMR line-item applies to any heat exchanger with raw water on either side of the heat exchanger tubes. It is the same as A-72 (also see endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment and agreed that the copper alloy heat exchanger tubes in a raw water environment could result in reduction of heat transfer. A new AMR line-item SP-56 was created. The GALL Report was revised to address this proposed change.
G-VIII-GC-1l	SP-58	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of reduction of heat transfer/fouling of copper alloy heat exchanger tubes in a treated water environment. NEI recommended GALL AMP XI.M2, "Water Chemistry," for this application.	NEI stated that this AMR line-item applies to any heat exchanger with treated water on either side of the heat exchanger tubes. It is similar as SP-40, but for a different material (also see endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment and agreed that the copper alloy heat exchanger tubes in a treated water environment could result in reduction of heat transfer. However, the concluded that a validation program was necessary, and included in the AMP column XI.M32, "One-Time Inspection." Chapter XI.M32 is an acceptable verification program. The GALL Report was revised to address this proposed change.
G-VIII-GC-1m	SP-55	NEI recommended the creation of a new AMR line-item for the	NEI stated that this AMR line-item applies to heat exchanger	The staff agreed with this comment and agreed that the copper alloy piping in a

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		aging effects and mechanisms of loss of material/selective leaching of copper alloy >15% zinc piping, piping components, and piping elements in a treated water environment. NEI recommended GALL AMP XI.M33, "Selective Leaching of Materials," for this application	items and other supporting equipment. It is the same as AP-32 (also see endnotes to this table for NEI's presentation of general comment 1).	treated water environment would result in loss of material. A new AMR line-item SP-55 was created.
G-VIII-GC-1n	SP-54	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of cracking/stress corrosion cracking of stainless steel piping, piping components, and piping elements in a closed cycle cooling water environment. NEI recommended GALL AMP XI.M21, "Closed Cycle Cooling Water System," for this application.	NEI stated that the basis for AP-60 is applicable to components in steam and power conversion systems where closed cooling water temperatures exceed 140°F in supporting systems, such as bearing and lube oil coolers and associated piping that are considered part of these systems. SP-39 addresses a different aging mechanism for this same group of components (also see endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment and agreed that the stainless steel piping in a closed cycle cooling water environment would result in cracking. The staff also modified GALL AMP XI.M21, "Closed Cycle Cooling Water System," to address managing the aging effect of cracking. The GALL Report was revised to address this proposed change.
G-VIII-GC-1o	SP-53	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of reduction of heat transfer/fouling of copper alloy heat exchanger tubes in a lubricating oil environment. The aging management program recommended by NEI was plant-specific.	NEI stated that Calvert SER Section 3.2.2.3.3 acknowledged the potential for fouling of copper alloy components in a lubricating oil environment. The SER addressed components in a PWR ECCS system, but these conditions would be equally applicable to components of other systems with this environment (also see endnotes to this table for NEI's	The staff agreed with this comment and agreed that copper alloy tubing in a lubricating oil environment would result in the reduction of heat transfer. However, the staff revised the AMP column to read: Chapter XI.M39, "Lubricating Oil Analysis" and augmented by XI.M32, "One-Time Inspection." The GALL Report was revised to address this proposed change.

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			presentation of general comment 1).	
G-VIII-GC-1p	SP-62 SP-63	NEI recommended the creation of a new AMR line-item for the aging effects and mechanisms of reduction of heat transfer/fouling of steel and stainless steel heat exchanger tubes in a lubricating oil environment. The aging management program recommended by NEI was plant-specific.	NEI stated that this is line-item is similar to new AMR line-item SP-53 except for a different material. Heat exchanger tubes of steel would also be subject to fouling in a lubricating oil environment (also see endnotes to this table for NEI's presentation of general comment 1).	The staff agreed with this comment and agreed that steel piping in a lubricating oil environment would result in loss of heat transfer. However, the staff revised the AMP column to read: "Chapter XI.M39, "Lubricating Oil Analysis" and augmented by Chapter XI.M32, "One-Time Inspection." The GALL Report was revised to address this proposed change.
G-VIII-GC-1q	VIII.I(1)	NEI recommended the creation of a new AMR line-item for steel piping, piping components, and piping elements in an inert containment environment. There was no aging management program recommended by NEI.	NEI stated that, while there would be moisture present, there would be an inerted atmosphere, which would not support corrosion. Only thin if any surface corrosion would be detected. Very little aging is expected (also see endnotes to this table for NEI's presentation of general comment 1).	The staff did not agree with this comment. There are situations where the containment is not inerted, for example, during outages the environment is not inerted, and when inerted, leakage is allowed per the Technical Specifications. Potential exists for aging effects due to these conditions. The GALL Report was not revised to address this proposed change.
G-VIII-GC-3a	S-06 S-07 S-10 S-14 S-19 S-39 SP-16 SP-17 SP-18 SP-43 SP-44 SP-45	NEI recommended deletion of the reference to EPRI document TR102134 from the AMP column in the line-items.	NEI stated that the reference to this specific EPRI document need not be included in the line-item AMP column because this information is provided in GALL AMP XI.M2, the AMP description in Chapter XI of GALL. Within the AMR line-items, it is adequate and internally consistent simply to reference AMP XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134. as	The staff agreed with this comment. Previously, EPRI TR-102134 was referenced in the AMP column of the AMR line-items; the AMP column was revised to read: "Chapter XI.M2, "Water Chemistry," for BWR secondary water." The GALL Report was revised to address this proposed change.

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	SP-46		Chapter XI.M2, “Water Chemistry,” for PWR secondary water (see also the endnotes to this table for NEI’s presentation of general comment 3).	
G-VIII-GC-3b	S-04 S-05 S-09 S-13 S-18 S-21 SP-19	NEI recommended deletion of the reference to EPRI document TR103515 from the AMP column in the line-items.	NEI stated that the reference to this specific EPRI document need not be included in the line-item AMP column because this information is provided in GALL AMP XI.M2, Within the AMR line-items, it is adequate and internally consistent simply to reference AMP XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515). Chapter XI.M2, “Water Chemistry,” for BWR water (see also the endnotes to this table for NEI’s presentation of general comment 3).	The staff agreed with this comment. Previously, BWRVIP-29 (EPRI TR-103515) was referenced in the AMP column of the AMR line-items; AMP column revised to read: “Chapter XI.M2, “Water Chemistry,” for BWR water.” The GALL Report was revised to address this proposed change.
G-VIII-GC-3c	S-22	NEI recommended deletion of the reference to EPRI document TR105714 from the AMP column in the line-items.	NEI stated that the reference to this specific EPRI document need not be included in the line-item AMP columns because this information is provided in GALL AMP XI.M2, Within the AMR line-items, it is adequate and internally consistent simply to reference AMP XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-105714. Chapter XI.M2, “Water Chemistry,” for PWR secondary water (see also the endnotes to this table for NEI’s presentation	The staff agreed with this comment. Previously, EPRI TR-105714 was referenced in the AMP column of the AMR line-items; the AMP column was revised to read: “Chapter XI.M2, “Water Chemistry,” for PWR secondary water.” The GALL Report was revised to address this proposed change.

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			of general comment 3).	
G-VIII-GC-4a	S-01 S-31 SP-26 SP-37	NEI recommended deletion of the line-items that address the external surfaces of components and bolting from the applicable systems table and move them to a new external surfaces aging management program table.	NEI stated that the appropriate location for line-items that address external surfaces is for all to be co-located in the new external surfaces aging management program table rather than within their applicable system tables, but that line-items that refer to a unique aging management program, e.g., the fire protection program, which monitors fire doors, should remain with the appropriate systems table (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff did not agree with this comment. The staff noted that it was important for its reviewers to know to what system each line-item belonged; this information was important and useful in performing its reviews to know which specific systems are addressed by which line-items. The staff thus decided that it was more beneficial to the review to include each line-item is in its appropriate system than to group these components by the surface to be examined. The GALL Report was not revised to address this proposed change. The staff did not agree with this comment.
G-VIII-GC-4b	S-02 S-03 S-29 S-32 S-34 S-41 S-42	NEI recommended the modification of these line-items for the aging effects and mechanisms of loss of material/general, pitting, and crevice corrosion, and cracking/ cyclic loading, stress corrosion cracking of steel of steel or low alloy steel external surfaces, including closure bolting, in an outdoor air, air with steam or water leakage, or uncontrolled indoor air environments. NEI recommended Chapter XI.M36, "External Surface Monitoring." NEI proposed to add this AMP "External Surfaces Monitoring."	NEI stated that these line-items should be consolidated under the previously external surfaces monitoring program, including S-41, S-02, and S-29 (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff reviewed these components and did not agree to consolidate these line-items. The staff believes that applicants and staff reviewers need to know to what system each line-item belongs to. Thus, it will be beneficial if each line-item is in its appropriate system than to group these components by the surface to be examined. This information enables the applicants and staff reviewers to identify which specific systems are addressed by the corresponding line-items. The GALL Report was not revised to address this proposed change. However, for S-29, S-41, and S-42, the staff changed the plant-specific AMP to Chapter XI.M36, "External Surfaces

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				Monitoring."
G-VIII-GC-4c	S-30 S-40	NEI recommended the modification of these line-items for the aging effects and mechanisms of loss of material/ boric acid corrosion of steel external surfaces, including closure bolting, in an air with borated water leakage environment.	NEI stated that these line-items should be consolidated under the previously external surfaces monitoring program, including S-30 (VIII.H-9) (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff did not agree with this comment. The staff reviewed these components and did not agree to consolidate these line-items. The staff believes that applicants and staff reviewers need to know to what system each line-item belongs to. Thus, it will be beneficial if each line-item is in its appropriate system than to group these components by the surface to be examined. This information enables the applicants and staff reviewers to identify which specific systems are addressed by the corresponding line-items. The GALL Report was not revised to address this proposed change.
G-VIII-GC-4d	S-42	NEI recommended the modification of this AMR line-item for the aging effects and mechanisms of loss of material/general corrosion of steel external surfaces in a condensation environment. NEI recommended Chapter XI.M36, External Surfaces Monitoring." NEI proposed to add this AMP "External Surfaces Monitoring."	NEI stated that these line-items should be consolidated under the previously external surfaces monitoring program, including S-41 (VIII.H-8) (see also the endnotes to this table for NEI's presentation of general comment 4).	The staff reviewed these components and did not agree to consolidate these line-items. The staff believes that applicants and staff reviewers need to know to what system each line-item belongs to. Thus, it will be beneficial if each line-item is in its appropriate system than to group these components by the surface to be examined. This information enables the applicants and staff reviewers to identify which specific systems are addressed by the corresponding line-items. The staff did agree to change the plant-specific program to Chapter XI.M36, "External Surfaces Monitoring."
G-VIII-GC-5	S-17 S-18 S-19	NEI recommended deletion of the references to reactor type and to heat exchanger shell and	NEI stated that many GALL items referring to heat exchanger components indicate	The staff agreed with this comment. The staff agreed that the aging effects and aging programs are applicable to the

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	S-20 S-21 S-22 S-23 S-24 S-25 S-26 S-39	tube side components, as appropriate.	whether the line-item applies to the tube side or the shell side. However, the designation of the tube side or shell side of a heat exchanger unnecessarily limits the applicability of the GALL line-item. Small heat exchangers in particular can be configured with the cooled fluid on either the shell or tube side. For heat exchangers with a given set of materials and environments, the configuration of the heat exchanger (tube side vs. shell side) will not alter the aging effects or the aging management programs. Consequently, the component descriptions for these lines should be changed to delete the tube side or shell side designation (see also the endnotes to this table for NEI's presentation of general comment 5).	component, regardless of heat exchanger design, (i.e., of either shell or tube side) thus, it was appropriate to include both sides, not just one. The GALL Report was revised to address this proposed change.
G-VIII-GC-6	S-33	NEI recommended the deletion of this AMR line-item.	NEI stated that loss of preload is not an aging effect (see also the endnotes to this table for NEI's presentation of general comment 6).	The staff agreed with this comment. The staff agreed that loss of preload due to stress relaxation (creep) can only be a concern in very high temperature applications (> 700°F). In EPRI TR-104213 and EPRI NP-5067, loss of preload due to gasket creep, thermal effects (including differential expansion and creep or stress relaxation), and self-loosening (which includes

Table A.2.7: Disposition of NEI Comments on Chapter VIII of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				vibration, joint flexing, cyclic shear loads, thermal cycles) is discussed. The staff determined that this combination of aging mechanisms will replace 'stress relaxation.' Thus the replacement aging effect/aging mechanism will be loss of preload/ thermal effects, gasket creep, and self-loosening. The GALL Report was modified to address this comment.
G-VIII-C-1	S-08	NEI recommended the modification of line-items for the aging effects and mechanisms of cumulative fatigue damage/fatigue of steel piping, piping components, and piping elements in a steam environment to include treated water environments.	NEI stated that the aging effect of fatigue may not be limited to only steel piping in a steam environment, but that such piping in a treated water environment was also susceptible to fatigue.	The staff agreed with this comment. The staff reviewed these components and agreed that fatigue is a time-limited aging analysis, and that it will have an aging effect regardless of the environment in which the item is located. The GALL Report was revised to address this proposed change.
G-VIII-C-2	S-13 S-14 SP-42	NEI recommended the deletion of these line-items.	NEI stated that these components (tanks) are included under the definition of piping, and that tanks should be considered there and not separately.	The staff did not agree with this comment. The staff believes tanks need to be addressed separately from the piping category, due to their differing environments (e.g., stagnant conditions). The GALL Report was not revised to address this proposed change.

<u>**Endnotes Clarifying General Comments Provided by NEI**</u>

1. **General Comment 1 (GC1) for New AMR Line-Items:** NEI proposed new lines items are listed at the end of each table. The new lines are designated "New VIII.X(Y) where X is the table identifier and Y is a sequential number for lines in that table. Where the same line-item is proposed in multiple tables, the other tables are listed below the designation.

2. **General Comment 2 (GC2) for Stainless Steel in Treated Borated Water:** This General comment does not apply to this GALL chapter.

3. **General Comment 3 (GC3) Water Chemistry Reference:** NEI pointed out that the reference to the specific EPRI document need not be included in the Aging Management Program column. This information is identified in the AMP description in Chapter XI of GALL.

4. **General Comment 4 (GC4) External Environments:** NEI commented that the introductory text to Chapter VIII systems tables refers to an external surfaces table H at the end of the chapter for aging management programs for the degradation of external surfaces of components and miscellaneous bolting. However, many external surfaces and external bolting entries are still within the individual systems tables. NEI proposed to move most external surface and external bolting lines to the external table. Any lines which refer to a unique aging management program (e.g., Fire Protection Program to monitor fire doors) would remain with the system table.

5. **General Comment 5 (GC5) Heat Exchanger Components Description:** NEI noted that many GALL items referring to heat exchanger components indicate whether the line-item applies to the tube side or the shell side. However, the designation of the tube side or shell side of a heat exchanger unnecessarily limits the applicability of the GALL line-item. Small heat exchangers in particular can be configured with the cooled fluid on either the shell or tube side. For heat exchangers with a given set of materials and environments, the configuration of the heat exchanger (tube side vs. shell side) will not alter the aging effects or the aging management programs. Consequently, the component descriptions for these lines should be changed to delete the tube side or shell side designation. Similarly, some lines list heat exchanger components including tubes. For aging effects other than the reduction of heat transfer, tubes may be considered with other heat exchanger components. Thus, for aging effects other than reduction of heat transfer, the component description should be "Heat exchanger components." The descriptor "Heat exchanger tubes" should be used when addressing reduction of heat transfer.

6. **General Comment 6 (GC6) Bolting:** NEI suggested that, consistent with its Chapter IX comment, high strength low alloy steel should be 'Low alloy steel.' Also, bolt strength does not impact the fatigue or wear aging mechanisms.

   NEI further said that, although some utilities have conservatively applied loss of preload as aging effect for bolting, the industry does not consider loss of preload as an aging effect requiring management. In accordance with EPRI 1003056, "Mechanical

Tool," Appendix F, loss of preload is a design driven effect and not an aging effect requiring management. The bolting at most facilities is standard grade B7 carbon steel, or similar material, except in rare specialized applications. Loss of preload due to stress relaxation (creep) for this material can only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code Section II Part D Table 4 Note 4. However, there is no bolting used in BWRs and PWRs that operate at 700°F, with the exception of unique applications, such as the emergency diesel generator exhaust. Therefore, loss of preload due to stress relaxation (creep) is not a valid aging effect.

In addition, NEI stated that the industry has taken actions to address NUREG –1339, "Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants." Licensees have implemented good bolting practices in accordance with those referenced in EPRI NP-5769, EPRI NP-5067, and EPRI TR-104213 in normal maintenance and design activities. Normal maintenance and design activities thus address the potential for loss of preload such that it is not a concern for the current or extended operating term. Proper joint preparation and make-up in accordance with industry standards precludes loss of preload. Even other design factors that could contribute to a loss of preload in closure bolting applications, such as vibration, should not result in loosening in a properly designed and assembled bolted joint.

NEI suggested that he impact to the GALL tables is that, with elimination of loss of preload as an aging effect, closure bolting has the same MEAP as external surfaces and the lines could be combined.

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IX-B-1	IX.B, Pg. IX-3, 6th line-item	Add 'tanks' to the list of various features of the piping, piping components, and piping elements that are within the scope of license renewal.	This component category was intended to encompass all components when evaluating material and environment combinations where the configuration of the component, and thus its specific type, has no impact on the aging effects. While the word "examples" indicates the list is only partial, the inclusion of at least one larger component type would further clarify the definition as all inclusive.	The staff did not agree with this comment because a tank is not an aspect of piping. The staff decided that the listing will continue to state, "Examples include piping, fittings, tubing, flow elements/indicators, demineralizer, nozzles, and orifices, flex hoses, pump casing and bowl, safe ends, sight glasses, spray head, strainers, thermowells, and valve body and bonnet." The GALL Report was not revised to address this proposed change.
G-IX-B-V.1	IX.B, Pg. IX-3, create new 3rd line-item	Add new component: Encapsulation Components/ Valve Chambers	Encapsulation components are not currently a GALL SSC term, but a precedent exists for including these items based on the Millstone and Farley LRAs and corresponding staff reviews. The staff accepted the aging management programs identified by these applicants for these material and environment combinations for loss of material in the Millstone SER Section 2.3A.2.3 and Farley SER Section 3.2.2.2.2.	The staff agreed with this comment. The term "encapsulation components/ valve chambers" was added to GALL in IX and defined as: "These are airtight enclosures that function as a secondary containment boundary to completely enclose containment sump lines and isolation valves." A new AMR line-item EP-42 was created to the GALL Report for this SSC. The GALL Report was revised to address this proposed change.
G-IX-B-VI.1	IX.B, Pg. IX-3, 3rd line-item	The definition of high-voltage insulators for license renewal should include the insulator used to support the bus bar in MEB at low, and medium-voltages	The existing phrasing of high-voltage insulators only refers to "those used to support and insulate high voltage electrical components in switchyards, switching stations, and transmission lines."	The staff did not agree with this comment. The staff notes that high voltage insulators are defined as those that handle voltage >34.9 kV. Low and medium-voltage insulators are covered under the GALL AMP XI.E4 "Metal-enclosed Buses."

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				The GALL Report was not revised to address this proposed change.
G-IX-C-1	IX.C, Pg. IX-5, 3rd line-item	Add the sentence: *CASS is susceptible to loss of fracture toughness due to thermal and neutron irradiation embrittlement.*	Within the context of license renewal, CASS should be considered to be a category of stainless steel except where thermal and neutron irradiation embrittlement is considered as an aging effect.	The staff agreed with this comment. The staff agreed that the additional sentence did clarify the behavior of CASS so the sentence was added. However, in certain cases, CASS will still retain its identity in AMR line-items in GALL, Rev. 1, even when the aging mechanism is SCC (as in the case of R-05). The GALL Report was revised to address this proposed change.
G-IX-C-2a	IX.C, Pg. IX-7, 6th line-item	Change the definition of stainless steel so that CASS becomes part of it unless the aging effect/mechanism is: *loss of fracture toughness due to thermal and neutron irradiation embrittlement.*	CASS aging effects should be managed the same as stainless steel other than thermal and neutron irradiation embrittlement. This permits CASS to be treated as a subset of stainless steel. CASS is then only listed as a material when loss of fracture toughness due to thermal (or thermal and irradiation) embrittlement is at issue, or where unique AMP requirements are given. This provides consistency with GALL's treatment of other material groups, e.g., gray cast iron as a subset of steel, and copper alloy >15% zinc as a subset of copper alloy. Gray cast iron and copper alloy >15% zinc are both susceptible to selective leaching and are only listed as materials when selective leaching is addressed.	The staff agreed with this comment with modification. The staff incorporated some of the suggested changes in the new description of stainless steel. However, in certain cases, CASS will still retain its identity in AMR line-items in GALL, Rev. 1, even when the aging mechanism is SCC (as in the case of R-05) because the AMP is unique. For R-05, the AMP states "Monitoring and control of primary water chemistry in accordance with the guidelines in EPRI TR-105714 (Rev. 3 or later revisions or updates) minimize the potential of SCC, and material selection according to the NUREG-0313, Rev. 2 guidelines of ≤0.035% C and ≥7.5% ferrite reduces susceptibility to SCC. For CASS components that do not meet either one of the above guidelines, a plant-specific aging management program is to be

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				evaluated. The program is to include (a) adequate inspection methods to ensure detection of cracks, and (b) flaw evaluation methodology for CASS components that are susceptible to thermal aging embrittlement." The GALL Report was revised to address this proposed change.
G-IX-C-2b	IX.C, Pg. IX-7, 6th line-item	Change the definition of stainless steel so that: *Steel with stainless steel cladding may also be considered stainless steel when the aging effect is associated with the stainless steel surface of the material rather than the composite volume of the material.*	The stainless steel surface of cladding on steel can be considered to be the same as stainless steel for most common aging effects. For volumetric aging effect such as fatigue, steel with stainless steel cladding should be listed as a separate material.	The staff agreed with this comment. The staff agreed that this change provides added clarity to the license renewal guidance documents. In certain cases in AMR line-items reference to components fabricated from steel with stainless steel cladding was retained. The GALL Report was revised to address this proposed change.
G-IX-C-IV-1	IX.C, Pg. IX-6, 3rd line-item	Change the description of high strength low alloy steel to "low-alloy steel" and rewrite to simply describe typical bolting used in nuclear applications. Clarify that high strength bolting are those with actual measured yield strength, S_y, ≥ 150 ksi.	The "High strength" modifier refers to susceptibility to the cracking aging effect. SA193 Grade B7 bolting is not "high strength" per the definition provided on page 12 of NUREG-1339. The categorization should be based on the actual measured yield strength, S_y, and not on the specified minimum yield strength.	The staff agreed with this comment. The staff agreed that this change provides added clarity to the license renewal guidance documents. Since not all low-alloy steel is subject to SCC, this suggestion was revised to retain reference to high-strength low-alloy steel. The GALL Report was revised to address this proposed change.
G-IX-C-IV-2	IX.C, Pg. IX-6, 7th line-item	PH stainless steel forging should be subsumed by the definition of "stainless steel."	There is nothing distinct in the AMR line-items associated with this material that warrants special treatment.	The staff agreed with this comment. Precipitation hardened (PH) martensitic stainless steel is subject to the same aging effects and aging mechanisms as other stainless steels and thus is no

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				longer specially defined. The 2005 counterparts of the GALL'01 AMR line-items that specified PH stainless steel forgings (IV B4.4-d, IV B4.4-c, IV B4.4-a, IV B4.4-e) now simply reference stainless steel. The GALL Report was revised to address this proposed change.
G-IX-C-VI.1	IX.C, Pg. IX-7, 3rd line-item	Add the term "Malleable iron" under the description of steel.	Malleable iron is defined nowhere else in the LRG documents.	The staff agreed with this comment. The definition for steel in Table IX.C was revised to state "For a given environment, carbon steel, alloy steel, cast iron, gray cast iron, malleable iron, and high strength low alloy steel are vulnerable to general, pitting, and crevice corrosion even though the rates of aging may vary. Another line-item was created in Table IX.C, for malleable iron that states - - Malleable iron usually means malleable cast iron, characterized by exhibiting some elongation and reduction in area in tensile test. Malleable iron is one of the materials in the suite of "Porcelain, Malleable iron, aluminum, galvanized steel, cement" used to define the high voltage insulators subject to degradation of insulator quality/ presence of any salt deposits or surface contamination (AMR line-item LP-07) or loss of material/ mechanical wear due to wind blowing on transmission conductors (AMR line-item LP-11).

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				The GALL Report was revised to address this proposed change
G-IX-C-VI.2	IX.C, Pg. IX-5, 3rd line-item	Add the term "porcelain "under the description of steel.	Porcelain is defined nowhere else in the LRG documents.	The staff agreed with this comment. Porcelain and glass are quite different materials. The definition of glass was enhanced to state that "Glass is a hard, amorphous, brittle substance made by fusing together one or more of the oxides of silicon, boron, or phosphorous, with certain basic oxides (e.g., Na, Mg, Ca, K), and cooling the product rapidly to prevent crystallization or devitrification." Another line-item was created in Table IX.C, for porcelain that states - - Hard-quality porcelain is used as an insulator for supporting high-voltage electrical insulators. Porcelain is a hard, fine-grained ceramic that essentially consists of kaolin, quartz, and feldspar that is fired at high temperatures. Porcelain is one of the materials in the suite of "Porcelain, Malleable iron, aluminum, galvanized steel, cement" used to define the high voltage insulators subject to degradation of insulator quality/ presence of any salt deposits or surface contamination (AMR line-item LP-07) or loss of material/ mechanical wear due to wind blowing on transmission conductors (AMR line-item LP-11). The GALL Report was revised to address this proposed change
G-IX-D-1	Table IX.D,	Replace the term "air" with "Air	Have consistency between terms	The staff agreed with this comment.

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	Page IX-10, no corresponding line-item	– indoor controlled/uncontrolled, Air - outdoor."	in AMR line-items and Chapter IX. The term "air" is undefined in Chapter IX although it is associated with AMR line-items AP-48 and SP-33 for Glass in Chapters VII and VIII.	The term "air" was replaced with "Air – indoor controlled/uncontrolled, Air - outdoor." The GALL Report was revised to address this proposed change.
G-IX-D-2	Table IX.D, Page IX-10, no corresponding line-item	Replace the term "air - indoor" (found in LP-01) with "Air – indoor controlled/uncontrolled, Air - outdoor."	Have consistency between terms in AMR line-items and Chapter IX The term "air - indoor" is undefined in Chapter IX although it is associated with AMR line-items LP-01.	The staff agreed with this comment. Air - indoor was added as an environment. The GALL Report was revised to address this proposed change.
G-IX-D-3	Table IX.D, Page IX-12, 7th line-item	Delete the examples of closed cycle cooling water. The suggested rewording is as follows: Treated water subject to the closed cycle cooling water chemistry program. Closed cycle cooling water >60°C (>140°F) allows the possibility of stainless steel SCC.	The examples should be removed as it may be viewed as limiting in terms of consistency.	The staff agreed with this comment. The description was rewritten. The examples were retained because they clarify rather than limit the definition provided. The GALL Report was revised to address this proposed change.
G-IX-D-4	Table IX.D, Page IX-12, 7th line-item	Simplify the definition of condensation as follows, "The environment to which the internal or external surface of the component or structure is exposed. Condensation on the surfaces of systems with temperatures below the dew point-is considered raw"	NEI simplified the definition so that condensation can be considered anywhere it occurs.	The staff agreed with this comment. The description was rewritten for clarity to read: "The environment to which the internal or external surface of the component or structure is exposed. Condensation on the surfaces of systems with temperatures below the dew point is considered raw water due to potential for surface contamination. For the purposes of NUREG-1801, Rev. 1, under certain circumstances the GALL Rev. 0, terms "moist air" or "warm moist air" are enveloped by condensation to describe an

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				environment where there is enough moisture for corrosion to occur." The GALL Report was revised to address this proposed change.
G-IX-D-5	IX.D, Pg. IX-11, no corresponding AMR line-item.	Create a new definition for Containment environment (inert). "The drywell is made inert with nitrogen to render the primary containment atmosphere non-flammable by maintaining the oxygen content below 4% by volume during normal operation." Create conforming line-items in Chapters IV, V, VII, and VII. For example: Piping, piping components, and piping elements/Steel/Containment environment/None/None	There currently is not an environment defined for inside the containment of BWRs, where the normal environment is inerted with nitrogen to less than 4% oxygen, as required by plant technical specifications. The environments "Air – indoor uncontrolled" and "Air – indoor uncontrolled or air – outdoor" as defined in GALL, and as explained in the basis document, include both "inside and outside containment", but make no reference to the low oxygen content inside the containment of BWRs When the environment of the external surface of a component is containment atmosphere, and the oxygen content is <4%, then loss of material will not be an aging effect for steel, carbon steel, and other metals that would be susceptible to loss of material in an air environment. The NRC staff agreed to this position in the SER for the Dresden Quad Cities license renewal application (NUREG 1796). The following is taken from NUREG 1796, section 3.1.2.4.5 on page 3-160, "NRC	The staff did not agree with this comment. The staff expressed concern about what would happen during outages and decided it was not an appropriate new environment for the mechanical system AMR line-items in the GALL Report. The GALL Report was not revised to address this proposed change.

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			staff agreed with the applicant that there are no applicable aging effects for external surfaces of carbon components exposed to a containment nitrogen environment because the low oxygen level present in the primary containment atmosphere precludes loss of material due to corrosion as a credible aging effect for the external surface of carbon steel components exposed to the containment environment."	
G-IX-D-6	IX.D, Pg. IX-13, 10th line-item	Simplify the definition for sodium pentaborate solution to simply say *Treated water that contains a mixture of borax and boric acid* *Delete the following words.* ~~BWR operators are required to upgrade their standby liquid control systems with sodium pentaborate solution. The use of higher fuel enrichments and the popularity of MOX fuels tax reactivity controls at BWRs and enriched sodium pentaborate provides an excellent solution for these new requirements~~	The original definition did not describe the solution.	The staff agreed with this comment. The description was rewritten exactly as suggested by NEI. The GALL Report was revised to address this proposed change.
G-IX-D-7	IX.D, Pg. IX-12, 13th line-item	Delete the environmental term of steam (dry).	The BWR main steam system is considered dry (usually ~99.9% dry) but the PWR main steam system can contain moisture and thus not fall into this category.	The staff agreed with this comment. The environmental description was deleted from AMR line-items and deleted from GALL Chapter IX. The GALL Report was revised to address this proposed change.

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IX-D-8	IX.D, Pg. IX-12, 21st line-item	Delete the environmental term of untreated water. Define raw water as: Raw untreated fresh, salt, or ground water. Floor drains and reactor buildings and auxiliary building sumps may be exposed to a variety of untreated water that is thus classified as raw water for the determination of aging effects. *Raw* water ~~that~~ may contain contaminants including oil and boric acid depending on the location and including originally treated water that is not monitored by a chemistry program.	NEI suggested that untreated water and raw water are redundant environments and should be consolidated. NEI stated further that the consolidation of environments will add to the consistency in the usage of the GALL.	The staff agreed with this comment. The staff agreed that consolidating these environmental terms is more productive. The GALL Report was revised to address this proposed change.
G-IX-D-VI.1	IX.D, Pg. IX-8, 3rd paragraph	Add a second sentence that states "When applied to the elastomers used in cable insulation, it should be noted that most cable insulation is manufactured as either 75°C (167°F) or 90°C (194°F) rated material."	The added sentence provides clarification that an aging effect is not expected for electrical cable insulation.	The staff agreed with this comment. The paragraph has been revised to state "Temperature threshold of 95°F (35°C) for thermal stresses in elastomers: In general, if the ambient temperature is less than about 95°F (35°C), then thermal aging may be considered not significant for rubber, butyl rubber, neoprene, nitrile rubber, silicone elastomer, fluoroelastomer, EPR, and EPDM [1]. When applied to the elastomers used in electrical cable insulation, it should be noted that most cable insulation is manufactured as either 75°C (167°F) or 90°C (194°F) rated material. The GALL Report was revised to address this proposed change

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-IX-D-VII.1	Table IX.D, Page IX-11, 5th line-item	Delete the term "Air, moist" which is duplicative" of "Condensation."	Removing duplicate environments removes confusion; this affects VII A-23.	The staff agreed with this comment. Both the definitions for moist air and condensation were modified to clarify the relationship. Moist air in the absence of condensation is also potentially aggressive, e.g., under conditions where hygroscopic surface contaminants are present. The AMR line-item VII A-23 was rewritten to state that the environment was moist air or condensation. The GALL Report was revised to address this proposed change.
G-IX-E-VI.1	IX.E, Pg. IX-14, 3rd paragraph	Qualify the description of degradation of insulator quality to note the transience of environmental conditions.	The presence of salt deposits or surface contamination results from temporary, transient environmental conditions, and therefore is not an aging mechanism or aging effect.	The staff agreed with this comment. The staff notes that although a natural phenomenon may be transient, the presence of salt deposits or surface contamination may be long-lasting and cumulative. The description was rewritten to state, "The decrease in insulating capacity can result from the presence of salt deposits or surface contamination. Although this derives from an aging mechanism (presence of salt deposits or surface contamination as noted in LP-07) that may be due to temporary, transient environmental conditions, the net result may be long-lasting and cumulative." The GALL Report was revised to address this proposed change
G-IX-E-VI.2	Table IX.E, Page IX-15, first line-item	Revise the description of fatigue in copper fuse holder clamps to note that electrical	NEI states that if a transient is within the rating of the fuse holder, then it does not contribute	The staff agreed with this comment. The staff notes that high temperature can result from electrical transients (NUREG

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		transients beyond the rating of the fuse holder are events or design-driven issues and are not part of the normal environment evaluated in AMRs.	to degradation of the fuse holder. The designs of fuse holders to meet the ANSI/UL 512 standard require them to have the ability to withstand thousands of fuse insertions and removals without failure. Therefore, when a fuse and fuse holder are used solely for circuit protection, there is no credible aging mechanism due to infrequent fuse manipulation.	1760 page 9) The entry for fatigue remains: "Fatigue in copper fuse holder clamps can result from ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, oxidation." The GALL Report was revised to address this comment
G-IX-E-VI.3	Table IX.E, Page IX-15, 8th line-item	Revise the description of loosening of bolted connections to note that thermal cycling during service up to the rated loading is not an aging mechanism	NEI points out that bolted connections for bus bar in metal-enclosed bus are designed for thermal cycling caused by ohmic heating up to the rated loading of the bus. NEI further states that ohmic heating due to bus overload beyond the design rating is a beyond design basis event rather than a normal stressor evaluated in the aging management review.	The staff agreed, in part, with this comment. The staff notes that loosened terminations were identified in several plants (SAND 96-0344). Additionally, EPRI TR-104213 recommends inspection of bolted joints for indication of loose bolts and recommends checking joint resistance of bolted joints using a low range ohm meter. The entry for loosening of bolted connections remains: "The loosening of bolted bus duct connections due to thermal cycling can result from ohmic heating" with markers to these references. The GALL Report was revised to address this comment
G-IX-E-VI.4	Table IX.E, Page IX-16, 1st line-item	Revise the description of Loss of Material to not include high-voltage insulators, loss of material attributed to mechanical wear or wind-induced abrasion and fatigue	NEI points out that there are neither high-voltage insulator failures attributed to this effect nor operating experience to support loss of material from high-voltage insulators.	The staff agreed with this comment with modification. The staff noted that there are instances of concern (SAND-96-0344) The last sentence in the entry will remain "For high voltage insulators, loss of material can be attributed to

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		due to wind blowing on transmission conductors.		mechanical wear or wind-induced abrasion and fatigue due to wind blowing on transmission conductors" but a reference will be added to support NRC's statement. The GALL Report was revised to address this comment
G-IX-F-1	Table IX.F, Page IX-19, 6th line-item	Delete the aging mechanism "Corrosion of embedded steel" and replace with "corrosion."	The definition of "corrosion" is adequate to encompass this combination of aging mechanism and location.	The staff did not agree with this comment. The staff noted that this expression, used a total of 9 times in GALL Rev. 1 chapters II, III, and VII, provides clarification about particular form of corrosion that is on significant concern. Thus the expression "Corrosion of embedded steel" is retained. The GALL Report was not revised to address this proposed change.
G-IX-F-2	Table IX.F, Page IX-21, 4th line-item	Add the following sentence to the existing definition of Flow-accelerated corrosion (FAC). *Susceptibility may be determined using the review process outlined in Section 4.2 of NSAC-202L-R2.*	The definition should be tied to the susceptibility reviews that can be performed per Section 4.2 of NSAC-202L-R2. NSAC-202L-R2 is used as a basis for AMP XI.M17 Flow-Accelerated Corrosion.	The staff agreed with this comment. The staff revised the description to state, "Also termed erosion-corrosion. A co-joint activity involving corrosion and erosion in the presence of a moving corrosive fluid, leading to the accelerated loss of material. Susceptibility may be determined using the review process outlined in Section 4.2 of the NSAC-202L-R2." The GALL Report was revised to address this proposed change.
G-IX-F-3	Table IX.F, Page IX-24,	The standardized expression "relaxation" should be deleted.	Loss of prestress due to relaxation is redundant to Loss of	The staff agreed with this comment. The sentence "Relaxation in structural steel

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	10th line-item	The description can be added to the "stress relaxation."	preload due to stress relaxation.	anchorage components can be an aging mechanism contributing to the aging effect of loss of prestress" was relocated to the description of stress relaxation. The GALL Report was revised to address this proposed change.
G-IX-F-IV.1	Table IX.F, Page IX-19, 5th line-item	Delete entry for "Corrosion of carbon steel tube support plate"	This standardized expression should be deleted. The definition of "corrosion" is adequate to encompass this combination of aging mechanism and location.	The staff did not agree with this comment. The staff noted that this expression, only used for R-43, provides clarification about particular form of corrosion that is of significant concern for nickel alloy tubes and sleeves. Thus the expression "Corrosion of carbon steel tube support plate" is retained. The GALL Report was not revised to address this proposed change.
G-IX-F-IV.2	Table IX.F, Page IX-23, 8th line-item	Delete entry for "Outer Diameter Stress Corrosion Cracking (ODSCC)"	This standardized expression should be deleted. The definition of "corrosion" is adequate to encompass this combination of aging mechanism and location.	The staff did not agree with this comment. The staff noted that this expression, only used for R-47, provides clarification about particular form of corrosion that is of significant concern for nickel alloy tubes and sleeves. Thus the expression "Outer Diameter Stress Corrosion Cracking (ODSCC)" is retained. The GALL Report was not revised to address this proposed change.
G-IX-F-VI.1	Table IX.F, Page IX-20, 6th line-item	Revise the description of electrical transients to quantify the transient or provide a threshold for this as an aging mechanism.	NEI points out that If the transient does not result in sufficient ohmic heating to affect the physical properties of the fuse clamp metal, no aging effect will occur	The staff agreed with this comment with modification. The staff notes that Electrical transients will cause overheating (NUREG 1760 page 9) The entry for electrical transients remains:

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				"Electrical transients are one of the aging mechanisms that can cause fatigue in copper fuse holder clamps." The GALL Report was revised to address this comment.
G-IX-F-VI.2	Table IX.F, Page IX-23, 3rd line-item	Revise the description of mechanical wear so that fatigue is no longer the lead-in word for the description.	Fatigue is not a subset of Mechanical Wear in any practical or theoretical manner. Wear is the physical removal of material at the surface of a metal and fatigue is a change in the internal physical properties of the metal at the grain boundary level. This is not a proper description of an aging mechanism for fuse holders or electrical lines due to wind blowing on transmission conductors.	The staff agreed with this comment. The entry was rewritten so it no longer begins by naming the stipulated aging effect (fatigue) caused by the defined aging mechanism. The entry was revised to state, "Degradation of copper clamps in fuse holders can be partially attributed to frequent manipulation, which is really a subset of mechanical wear (as referenced in LP-01). Other examples include mechanical wear of electrical lines due to wind blowing on transmission conductors as referenced in LP-11)…" The GALL Report was revised to address this comment.
G-IX-F-VI.3	Table IX.F, Page IX-23, 7th line-item	Revise entry for ohmic heating to be more general.	Ohmic heating is induced by current flow through a conductor and can be calculated using first principles of electricity and heat transfer. Ohmic heating is not restricted only to conductors passing through electrical penetrations.	The staff agreed with this comment. The entry was rewritten to state "Ohmic heating is induced by current flow through a conductor and can be calculated using first principles of electricity and heat transfer. Ohmic heating is a thermal stressor; and can be induced in situations such as conductors passing through electrical penetrations. Ohmic heating is especially significant for power circuit penetrations.[5]"

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				The GALL Report was revised to address this proposed change.
G-IX-F-VI.4	Table IX.F, Page IX-24, 4th line-item	Revise entry for "Presence of any Salt Deposits" to be more general.	NEI notes that the description of presence of any Salt Deposits should not include degradation of insulator quality since surface contamination is a short-term transient condition that does not change the material properties of an insulator. The effects of such deposits are relevant to the current license term and as such, should be addressed under 10 CFR 50.	The staff agreed with this comment. The staff notes that although a natural phenomenon may be transient, the presence of salt deposits or surface contamination may be long-lasting and cumulative. The entry was rewritten to state that the surface contamination resulting from the aggressive environment associated with the presence of any salt deposits can be an aging mechanism causing the aging effect of degradation of insulator quality. "Although this aging mechanism may be due to temporary, transient environmental conditions, the net result may be long-lasting and cumulative." The GALL Report was revised to address this comment
G-IX-F-VI.6	Table IX.F, Page IX-26, 4th line-item	Revise entry for "Water trees" to be more general.	Based on analysis of medium-voltage underground cable failures, electric trees that may result from water trees that penetrate the insulation are not the predominant cause of failures in underground polymeric-jacketed cables. This issue is being addressed by an NEI task force on medium-voltage underground cables as a separate concern under 10 CFR 50 in response to the February 5, 2004, letter from Jose Calvo (NRC).	The staff agreed with this comment. The definition was rewritten to state "Water trees occur when the insulating materials are exposed to long-term, continuous electrical stress and moisture; these trees eventually result in breakdown of the dielectric and ultimate failure. The growth and propagation of water trees is somewhat unpredictable. Water treeing is a degradation and long-term failure phenomenon." The GALL Report was revised to address this proposed change
G-IX-F-VII.1	Table IX.F,	Revise entry for "Cladding	NEI pointed out that the definition	The staff agreed with this comment. The

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	Page IX-19, 3rd line-item	degradation" to be more general. NEI suggested rewording: This refers to the degradation of the ~~stainless steel~~ cladding ~~(~~via any applicable degradation process ~~for stainless steel/applicable environment described in NUREG 1801)~~.	needs revision so that it conforms to the usage in the SRP-LR and the GALL Report. The definition in Chapter IX is not consistent with the usage of this term in Chapter VII. AMR line-item A-40 refers to the lining of piping and piping elements. The lining is a design feature and is not credited as part of the pressure boundary. Therefore, the definition provided is not accurate. The SRP-LR refers to the cracking of cladding.	aging mechanism description was rewritten exactly as suggested by NEI. The GALL Report was revised to address this proposed change.
G-IX-E/F1	Table IX.F, E – AMR line-items.	Restrict the use of the aging effect/mechanism for bolting "loss of preload/stress relaxation" to situations where there are very high temperature applications (>700°F).	Loss of preload due to stress relaxation (creep) is not a valid aging effect.	The staff agreed with this comment. A new aging mechanism of "Thermal effects, gasket creep, and self-loosening" was added in GALL Rev. 1 to be used as a substitute for stress relaxation in lower temperature conditions. The staff agree that ASME Code Section II Part D Table 4 Note G14 points out that loss of preload due to stress relaxation (creep) for B7 (low alloy steel –A193 B7, as stated in Appendix F of EPRI 1003056 and elsewhere) can only be a concern in very high temperature applications (> 700°F). The reference (EPRI TR-104213) replaces the earlier report EPRI NP-5067, *Good Bolting Practices, A Reference Manual for Nuclear Power Plant Maintenance Personnel.* In both

Table A.2.8: Disposition of NEI Comments on Chapter IX of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				documents, loss of preload due to gasket creep, thermal effects (including differential expansion and creep or stress relaxation), and self-loosening (which includes vibration, joint flexing, cyclic shear loads, thermal cycles) is discussed. The staff determined that this combination of aging mechanisms will replace 'stress relaxation.' Thus the replacement AE/AM will be loss of preload/ thermal effects, gasket creep, and self-loosening. The GALL Report was revised to address this comment.

This Page Intentionally Left Blank

Table A.2.9: Disposition of NEI Comments on Chapter X of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G-X.M1-1	Program Description	Eliminate change which added "and the severity" to the first paragraph of the program description as follows. In order not to exceed the design limit on fatigue usage, the aging management program (AMP) monitors and tracks the number and the severity of critical thermal and pressure transients for the selected reactor coolant system components.	This is adequately covered by the existing wording under the "Parameters Monitored/ Inspected" element, and could be viewed as requiring the program to monitor severity of transients (which is not done for those programs that only count cycles).	The staff agreed with this comment. The sentence in the program description was rewritten to state, "In order not to exceed the design limit on fatigue usage, the aging management program (AMP) monitors and tracks the number of critical thermal and pressure transients for the selected reactor coolant system components." The GALL Report was revised to address this proposed change.
G-X.M1-2	Program Description	Restore original text regarding critical components.	Changes to the "Program Description" and "Monitoring and Trending" elements of the AMP suggest scope of critical components goes beyond those identified in NUREG/CR-6260. The Bases Document does not provide a technical justification for this change. Suggest leaving the original wording.	The staff did not agree with this comment because there may be locations which could more limiting than those identified in NUREG-6260 and should be addressed. The GALL Report was not revised to address this proposed change.
G-X.M1-3	Monitoring and Trending	Restore original text regarding critical components.	Changes to the "Program Description" and "Monitoring and Trending" elements of the AMP suggest scope of critical components goes beyond those identified in NUREG/CR-6260. The Bases Document does not provide a technical justification for this change. Suggest leaving the original wording.	The staff did not agree with this comment because there may be locations which could more limiting than those identified in NUREG-6260 and should be addressed. The GALL Report was not revised to address this proposed change.
G-X.M1-4	Corrective Actions	Restructure sentence to make original meaning	Original (GALL'01) sentence Structure was awkward.	The staff agreed with this comment.

Table A.2.9: Disposition of NEI Comments on Chapter X of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		clear.	Addition of word “during” attempted to make sentence read better, but completely changed original meaning. Proposed change resolves original problem.	The GALL Report was revised to address this proposed change.

Table A.2.10: Disposition of NEI Comments on Chapter XI.E of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
XI.E-4-1	XI.E4, *Aging Management Program for Metal Enclosed Bus (MEB)*	Since no MEB aging management program has previously been required for nuclear plants with renewed licenses, there should be provisions for a licensee to show that the materials and environment for MEB do not produce the stressors that cause aging effects requiring management and an AMP is therefore not required.	The staff's proposed program was issued as ISG-17 in the Federal Register on December 23, 2004, and also as XI.E4 in GALL, each with a different comment period. An alternate to the proposed GALL AMP is provided with this document.	The staff did not agree with this comment because each applicant needs to provide in its application the rationale why an AMP is not required. The staff can then determine if they concur with the applicant rationale. The GALL Report was not revised to address this proposed change.
XI.E-4-2	XI.E4, *Aging Management Program for Metal Enclosed Bus (MEB)*	NEI recommends the use of "Metal Enclosed Bus" instead of "bus ducts" to denote electrical bus.	NEI recommends the change in name to differentiate the metal enclosed bus from out side enclosures around the electrically conducting bus bar, its supports, and insulating assemblies.	The staff agreed with this change in terminology. The GALL Report was revised to address this proposed change. The AMP is now titled, "Metal Enclosed Bus"
XI.E-4-3	XI.E4, *Aging Management Program for Metal Enclosed Bus (MEB)* elements 3, 4, and 6	Delete measuring for proper torque of bolted connections	Based on industry recommendations in EPRI TR-104213, bolted connections will not and should not be checked for proper torque unless guidance is provided by the bus manufacturer, since overtorquing can cause loose connections resulting in increased connection resistance.	The staff agreed with this comment. The GALL Report was revised to delete measuring for bolted connection torque. Additionally, as an alternative, a visual inspection can be performed.
XI.E-5-1	XI.E5, *Aging Management Program for Fuse Holders*	NEI recommends deleting the AMP XI.E5, "Fuse Holders." Also, NEI stated that visual inspection of fuse holders is sufficient to manage the effects of aging on fuse holders that	There is no technical or operating experience basis for the statement that "… failures of a deteriorated cable system (cables, connections including fuse holders, and penetrations)	The staff did not agree with this comment because operating experience documenting the failures of fuse holders has been provided in NRC Information Notices (INs). These NRC INs are referenced in ISG-5.

Table A.2.10: Disposition of NEI Comments on Chapter XI.E of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		are not subject to mechanical abuse. Testing should not be needed for fuse holders designed and constructed to UL standards that do not show signs of excessive temperature (discoloration, scorching, burned surfaces).	might be induced during event conditions." In addition, fuse holders are included in the EQ programs of many plants, similar to terminal blocks and other non-cable electrical components within the scope of 10 CFR 50.49. Operating experience has not shown significant failures due to fuse holder aging, but rather failures due to removal and reinsertion of fuses for circuit isolation purposes. This use of fuses is a design, procedural, or operational deficiency, for fuse holders that are not designed for this type of use.	Additionally, after receiving an industry comment (as summarized in this line XI.E-5-1) by a letter dated March 2, 2004, the staff revised the AMP on March 30, 2004. This new AMP is included in the GALL'05 revision.
XI.E-6-1	XI.E6, *Electrical Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements*	Cable connection metallic parts – NEI recommends deleting the AMP XI.E6, "Electrical Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	This is a proposed AMP that has not been published previously, has not been proposed in a draft or final ISG, and has not been required for any previously approved license renewal application. This AMP should be eliminated as these items either have no aging effects requiring management or are adequately covered by other AMPs. Operating experience does not indicate a need for this proposed program.	The staff did not agree with this comment because SAND 96-0344, "Aging Management Guidelines For Electrical Cable and Terminations," identified loosened terminations at several plants. Additionally, EPRI TR-104213 recommends inspection of bolted joints for evidence of overheating, signs of burning or discoloration and indication of loose bolts. It recommends checking the joint resistance of bolted joints using a low range ohmmeter. AMP XI.E1 manages the aging of insulating materials but not the metallic parts of the electrical connections, which is the subject of this new AMP. The GALL Report was not revised to address this proposed change.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
XI.M1.1	XI.M1 *ASME Section XI Inservice Inspection, Subsections IWB, IWC, AND IWD*	The footnote is based on ASME Section XI. The note discusses that the NRC adopts the use of updated versions of ASME XI in 10 CFR 50.55a but does not state that an applicant may credit the updated versions. The Bases Document for the revision to the GALL Report states that the addition of the code used in the plant's ISI program, which is based on 10 CFR 50.55a, can be used as an AMP in a LRA. Revise footnote wording as shown for XI.M1 in each AMP using the footnote (XI.M3 through M9).	The footnote added to several AMP program descriptions acknowledges that the ASME code required under 10CFR50.55a changes periodically but it does not clearly state the applicant can credit whatever code version is applicable during the period of extended operation. The rewording proposed corrects the discrepancy and will eliminate exceptions that applicants must take given the current wording. The proposed wording in the footnote will allow applicants to credit the revision of ASME XI that is credited in their current ISI plan as an acceptable aging management program for license renewal.	The staff did not agree with this comment. GALL'01 evaluated specific editions and addenda of the ASME Code to determine if the aging management achieved by the ISI programs is sufficient to satisfy the license renewal rule. GALL'01concluded that the specific edition and addenda augmented by certain inspections was sufficient to manage the aging effects listed in GALL. In recent 10 CFR 50.55a rulemakings, the associated Statement of Considerations authorize use of the editions and addenda of the ASME Code approved in the rulemaking, if augmented by the additional inspections defined in the GALL Report, without the need for the license renewal applicant to submit these alternatives for NRC review in its plant-specific renewal application. The only way that staff has assurance that future changes to the ASME Code retain the aging management integrity defined in the GALL Report is for an assessment of the specific actions associated with updated Code version/addenda to be evaluated against the license renewal rule. The industry proposal does not provide this assessment and was therefore found unacceptable.
XI.M2.1	XI.M2 *Water Chemistry* Program Description	Add the following words to the Program description, "Later versions of these chemistry program guidelines are developed from collective operating experience using sound technical judgment, and	EPRI guidelines change with experience. Plant chemistry programs generally adopt new guidance. Because later editions than listed in GALL will be used in future, the licenses to not want to tie themselves to	The staff did not agree with this comment. It is necessary to specify the edition of the EPRI document reviewed by the staff for license renewal because new revisions have not been reviewed for generic acceptance for use in license

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		are approved by the electric utility industry in an effort to constantly improve water chemistry and thereby manage or prevent aging effects. The later versions of these guidelines when reviewed and approved for implementation by the staff in applicant Safety Evaluation Reports may be used in lieu of the revisions or versions specified above."	a specific edition. GALL water chemistry program description already permits use of "later revisions or updates of these reports as approved by the staff."	renewal. The GALL Report was not revised to address this proposed change.
XI.M2.2.	XI.M2 *Water Chemistry* Scope of the Program, Preventive Actions, and Detection of Aging Effects.	Where ever "crack initiation and growth" is mentioned replace the words with "cracking"	The change will be consistent with current terminology used in the GALL Report.	The staff agreed with this comment. This change is consistent with the definitions provided in new Chapter IX in the GALL Report. The GALL Report was revised to address this proposed change.
XI.M7.1	XI.M7 *BWR Stress Corrosion* Cracking Program Description	The program description limits the scope to stainless steel. This program should also manage nickel-based alloys.	Nickel-based alloys are used for joint welds as well as for weld overlays in BWR reactor coolant pressure boundary piping. Nickel-based alloys are susceptible to IGSCC per Chapter IV of NUREG-1801. Specific discussions of inspection frequencies for nickel-based alloy materials are contained in applicable BWRVIP guidelines. In addition, Items R-68 and R-21 specifically align this program and material.	The staff agreed with this comment based on the fact that item R-21 is for nickel alloy and it references XI.M7. The GALL Report was revised to address this proposed change.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
XI.M7.2	XI.M7 *BWR Stress Corrosion* Cracking Program Description	This program should also manage cast austenitic stainless steel.	No change is required; if CASS is included in the definition of stainless steel. Cast austenitic stainless steel is used pumps, valves, and fittings in BWR reactor coolant pressure boundary piping. Cast austenitic stainless steel is susceptible to IGSCC per Chapter IV of NUREG-1801. Items R-20 and A-101 specifically align this program and material.	The definition of stainless steel in Chapter IX of GALL has been revised to include CASS. Thus, no change was required to this GALL program to address this comment.
XI.M7.3	XI.M7 *BWR Stress Corrosion Cracking* Program Description	There is a typographical error in the last sentence. The close parenthesis should be after "75":	Editorial correction, no justification is required.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M7.4	XI.M7 *BWR Stress Corrosion Cracking* Scope of Program	The program description limits the scope to stainless steel. This program should also manage nickel-based alloys and cast austenitic stainless steel.	See Justifications to Comments XI.M7.1 and XI.M7.2	This is the same as XI.M7.1 and XI.M7.2. The GALL Report was revised to address this proposed change.
XI.M7.5	XI.M7 *BWR Stress Corrosion Cracking* Preventive Action	The last paragraph states: "Reactor coolant water chemistry is monitored and maintained in accordance with the guidelines in BWRVIP-29 (Electric Power Research Institute [EPRI] TR-103515). The program description, and evaluation and technical basis of monitoring and	Recent applicants have received approval of their water chemistry programs based on later versions of the water chemistry guidelines. For example, NUREG-1769, Safety Evaluation Report Related to the License Renewal of Peach Bottom Atomic Power	The staff agreed with this comment with respect to deleting the reference to BWRVIP-29 and replacing it with the reference to XI.M2. The GALL Report was revised to address this proposed change.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		maintaining reactor water chemistry are presented in Section XI.M2, "Water Chemistry." The EPRI Water Chemistry Guidelines and their corresponding BWRVIP documents are living documents that capture industry operating experience and best practices. The reference to a specific version of the water chemistry guidelines would require each applicant to compare its water chemistry program to an old version of the guidelines with little chance of having a program that is consistent. The BWR SCC Program should only reference Section XI.M2, Water Chemistry.	Station, Units 2 and 3, stated in Section 3.0.3.2.2 on page 3-9 that: "The staff finds the provisions of the 2000 revision of EPRI TR-103515 acceptable because the program is based on updated industry experience." In conclusion, it is important to maintain the flexibility to modify plant chemistry control procedures based on the best industry guidance developed from the collective operating experience of similar reactors	
XI.M7.6	XI.M7 *BWR Stress Corrosion Cracking* Acceptance Criteria	The first paragraph states: "As recommended in NRC GL 88-01, any indication detected is evaluated in accordance with the ASME Section XI, Subsection IWB-3640 (2001 edition[6] including the 2002 and 2003 Addenda) and the guidelines of NUREG-0313." NRC GL 88-01 does not state that any indication detected is	For inspections performed per Generic Letter 88-01 the following acceptance criterion is applicable. The original Generic Letter, when discussing the staff position on crack evaluations, states the following: "Methods and criteria for crack evaluation and repair should be in conformance with IWB-3600	The staff agreed with this comment. The GALL Report was revised to address this proposed change.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		evaluated in accordance with the ASME Section XI, Subsection IWB-3640. This paragraph should be revised as follows: "As recommended in NRC GL 88-01, any indication detected is evaluated in accordance with the ASME Section XI, Subsection IWB-3600 (1986 edition) and the guidelines of NUREG-0313."	of Section XI of the 1986 Edition of the ASME Boiler and Pressure Vessel Code." Supplement 1 to Generic Letter 88-01 did not revise this requirement.	
XI.M7.7	XI.M7 *BWR Stress Corrosion Cracking* Acceptance Criteria	Since Note 6 is not required, the note description at the bottom of page XI M-26 should be deleted.	See the Justification for Comment XI.M7.6	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M7.8	XI.M7 *BWR Stress Corrosion Cracking* References	The 1986 Edition of ASME Section XI is not in the list of references. It should be added as follows: "ASME Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Boiler and Pressure Vessel Code, 1986 edition, American Society of Mechanical Engineers, New York, NY."	See the Justification for Comment XI.7.6	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M7.9	XI.M7 *BWR Stress Corrosion Cracking* References	Make conforming change to the reference.	See the Justification for Comment XI.M7.5	The staff agreed with this comment, see XI.M7.5. The GALL Report was revised to address this proposed change.
XI.M17.1	XI.M17	Modified criteria for sample	Plant FAC programs typically	The staff agreed with this comment.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	Flow -Accelerated Corrosion Monitoring and Trending	expansion.	use a threshold limit for sample expansion. Some plants use 125% of time to next outage, some use 70% min wall thickness, some use minimum allowable, some use 50%, or less than 1 operating cycle, or significant unexpected wall thinning. Some plants use a combination of the above. But a strict threshold based on measured degradation being more than predicted would require sample expansion where it is unnecessary. In a real world application, if the FAC program owner predicts the wear to be 5 mils over an 18-month period and the actual as found wear is 6 mils then, per the current GALL, sample expansion is necessary. Clearly, the wear is one element, but the minimum wall thickness is a critical input to the need for sample expansion. In this particular example, if the pipe wall is 0.25 inches and has a min allowable wall thickness of 0.15 inches, then the pipe will last 16 refueling cycles. Sample expansion in this case is really not necessary.	The GALL Report was revised to address this proposed change.
XI.M18.1	XI.M18 *Bolting*	The Bolting Integrity Program description has been extensively	Basis for most changes explained in the revisions to the	The staff agreed with this comment. The entire Bolting Integrity Program has been

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	Integrity Entire Description	revised the AMP to focus it on non-ASME bolting.	Program Description section.	rewritten. While the revised program does not implement the proposed NEI changes, it has been rewritten to better define the aging management strategies for the various classifications of bolting. The GALL Report was revised to address this proposed change.
XI.M18.2	XI.M18 *Bolting Integrity* Parameters Monitored/ Inspected	Explain that loss of preload is not an aging effect requiring management for non Class 1 bolting	Loss of preload is not an aging effect requiring management for non-Class 1 bolting. In accordance with EPRI 1003056 Appendix F, loss of preload is a design driven effect and not an aging effect requiring management. Loss of preload due to stress relaxation (creep) for standard grade B7 carbon steel bolting is only a concern in very high temperatures (> 700°F) as stated in the ASME Code Section II Part D Table 4 Note 4. Non-Class 1 systems never exceed this temperature. The majority of non-Class 1 bolting at most facilities is this same grade or very similar except in rare specialized applications. As a result stress relaxation should not occur for any of the non-Class 1 systems. In addition, the resolution to GSI-29 for licensees would have taken actions to address the potential for this effect such that it is not a concern for the	The staff acknowledges the NEI comment but concludes that additional mechanisms could lead to loss of preload/loss of prestress in addition to thermal effects. The AMP has been rewritten to refine the aging mechanisms that can lead to loss of preload/loss of prestress. Loss of preload/loss of prestress has been defined further in Chapter IX of GALL.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			current or extended operating term. This position has been previously approved by the staff in the VC Summer SER NUREG 1787 section 3.0.3.7.2.	
XI.M21.1	XI.M21 *Closed-Cycle Cooling Water System* Program Description	Clarify intent of guidance reference in EPRI TR-107396.	There are no specific standards for testing and inspections in the guideline. The EPRI document merely mentions testing and inspections that are commonly applied.	The staff agreed with this comment. Additionally, the program discussion was changed to add cracking /stress corrosion cracking in addition to corrosion as aging mechanisms managed by this AMP. The EPRI guidelines referenced by this AMP include management of this aging effect. This change (the inclusion of stress corrosion cracking as an aging effect managed by the AMP) was also included in other sections of the AMP, where appropriate. The GALL Report was revised to address this proposed change.
XI.M21.2	XI.M21 *Closed-Cycle Cooling Water System* Program Description	Acknowledge acceptability of later versions of EPRI document.	The proposed wording will permit an applicant to credit a revision of the EPRI guidelines that has been reviewed and as part of a previous application.	The staff did not agree with this comment (see XI.M2.1). The GALL Report was not revised to address this proposed change.
XI.M21.3	XI.M21 *Closed-Cycle Cooling Water System* Parameters Monitored/ Inspected	Clarify intent of guidance reference in EPRI TR-107396.	There are no specific standards for testing and inspections in the guideline. The EPRI document merely mentions testing and inspections that are commonly applied.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
XI.M21.4	XI.M21 *Closed-Cycle Cooling Water System* Detection of Aging Effects	Clarify intent of guidance reference in EPRI TR-107396.	EPRI does not provide details on extent and schedule of inspections. It is a guidance document not a standard.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M21.5	XI.M21 *Closed-Cycle Cooling Water System* Detection of Aging Effects	Eliminate “pump wear characteristics”	Pump wear characteristics is an active function that is not in the scope of license renewal.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M21.6	XI.M21 *Closed-Cycle Cooling Water System* Monitoring and Trending	Clarify intent of guidance reference in EPRI TR-107396.	There is no testing interval specification in the EPRI guideline	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M21.7	XI.M21 *Closed-Cycle Cooling Water System* Acceptance Criteria	Clarify intent of guidance reference in EPRI TR-107396.	EPRI does not provide guidance on performance test results	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M21.8	XI.M21 *Closed-Cycle Cooling Water System* Corrective Actions	Clarify intent of guidance reference in EPRI TR-107396.	EPRI does not provide corrective actions for performance failures.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
XI.M23.1	XI.M23 *Inspection of Overhead Heavy Load and Light Load (Related To Refueling) Handling Systems* Parameters Monitored/ Inspected	Delete sentence related to number of lifts.	It has been proven in previous applications that this is not a parameter that is monitored. Calculated number of lifts is significantly lower than crane is designed for.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M23.2	XI.M23 *Inspection of Overhead Heavy Load and Light Load (Related To Refueling) Handling Systems* Detection of Aging Effect	Delete sentence related to functional testing.	Functional tests do not detect aging effects.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M26.1	XI.M26 *Fire Protection* Detection of Aging Effect	Replace prescriptive inspection requirements with general requirement that inspectors are qualified.	There are no regulatory requirements or any other type of requirements specifying that these inspections be performed to VT-1 or VT-3 standards.	The staff agreed with this comment. The sentence was modified to state qualified fire protection inspectors. The GALL Report was revised to address this proposed change.
XI.M26.2	XI.M26 *Fire Protection* Acceptance Criteria	Add words to recognize allowable defect indications.	As currently worded, no indications of defects are acceptable. The criteria need to recognize variations from these strict limits that have been	The staff agreed with this comment because inspection is performed by fire protection qualified inspectors. The GALL Report is revised to address

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			approved for the seal configuration.	this comment.
XI.M27.1	XI.M27 *Fire Water System* Program Description	Modify code references.	The proposed changes recognize a second acceptable version of the NFPA Code.	The staff agreed with this comment because the 2002 version of the Code is acceptable. The GALL Report was revised to address this proposed change.
XI.M27.2	XI.M27 *Fire Water System* Program Description and Parameters Monitored/ Inspected	Modify sprinkler flow test requirements.	The proposed change recognizes practical flow test limitations.	The staff did not agree with this comment. Maximum flow is part of CLB, thus must be demonstrated to for license renewal. The GALL Report was not revised to address this proposed change.
XI.M27.3	XI.M27 *Fire Water System* Parameters Monitored/ Inspected	Delete specific code reference.	References do not correspond to the 2002 edition.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M27.4	XI.M27 *Fire Water System* Monitoring and Trending	Link requirements to plant commitments to code.	Existing plant commitments to code should determine monitoring and trending requirements.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M31.1	XI.M31 *Reactor Vessel Surveillance* Program Description	Modify sentences delineating storage requirements for capsules.	The proposed revisions define a more appropriate set of storage guidelines that are consistent with vessel surveillance requirements.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M32 .1	XIM32 *One-*	Move sentences related to timing	These sentences add no value	The staff agreed with this comment.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	Time Inspection Program Description	of OTI to section 4.0	since the timing is specified in section 4.0 and is neither appropriate nor fit for the description.	The GALL Report was revised to address this proposed change.
XI.M32 .2	XIM32 *One-Time Inspection* Program Description	Editorial comments	Editorial correction, no justification is required.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M32 .3	XIM32 *One-Time Inspection* Scope of Program	Editorial comments	Editorial correction, no justification is required.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M32 .4	XIM32 *One-Time Inspection* Parameters Monitored/ Inspected	Clarify relevance of ASME Code to inspection requirements.	Most of the components included in this program are not ASME Code components and as such should not be subjected to Code requirements. This new wording is consistent with wording in section 4.0.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M32.5	XIM32 *One-Time Inspection* Detection of Aging Effects	Editorial comments	Editorial correction, no justification is required.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M32.6	XIM32 *One-Time Inspection* Detection of Aging Effects	Remove table of example parameters/inspections	The addition of this table is unnecessary and overly prescriptive. In the prior paragraph wording is provided that the program will rely on established NDE techniques consistent with the Code that is sufficient for determining	The staff did not agree with this comment. The table provides examples of parameters monitored or inspected and aging effects and mechanisms for specific structures or components; these examples may not be appropriate for all relevant situations. If the applicant chooses to use an alternative to the

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			techniques. The techniques specified in the proposed table are Code requirements that should not be applied to non-code components. This will tie applicant's hands in the ability to use various approaches and other techniques that may be developed in the future and have to justify deviations.	recommendations in this table, a technical justification should be provided as an exception to this AMP. This exception should list the AMR line-item component, examination technique, acceptance criteria, evaluation standard, and a description of the justification. The GALL Report was revised to address this proposed change.
XI.M32.7	XIM32 *One-Time Inspection* Detection of Aging Effects	Move sentences related to timing of OTI to section 4.0	See comment 1	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M32 .8	XIM32 *One-Time Inspection* Operating Experience	Editorial comments	Editorial correction, no justification is required.	The staff agreed with this comment. The GALL Report was revised to address this proposed change.
XI.M36	XIM36 *External Surfaces Monitoring Program*	This is a new program; NEI proposed to add this AMP.	This program entails inspections of external surfaces of components in systems	The staff agreed with this comment with some modification. The GALL Report was revised to address this proposed change.
XI.M37	XIM37 *Flux Thimble Tube Inspection Program*	This is a new program; NEI proposed to add this AMP.	NEI recommends a new inspection program to monitor for the thinning of the flux thimble tube walls, which provide a path for the incore sensors to travel from the seal table, through the bottom of the reactor vessel, and into selected fuel assemblies. The thimble tubes over most of the length serve as the RCS	The staff agreed with this comment with some modification. The GALL Report was revised to address this proposed change.

Table A.2.11: Disposition of NEI Comments on Chapter XI.M of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			pressure boundary and are experiencing thinning as a result of flow-induced vibration. It appears that the only effective method for determining thimble tube integrity is through plant-specific inspections and periodic monitoring. An NDE methodology, such as eddy current testing (ECT), is used to monitor for wear of the flux thimble tubes. This program implements the recommendations of NRC IE Bulletin 88-09,	

Table A.2.12: Disposition of NEI Comments on Chapter XI.S of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
G.XI-S-1	XI.S1, *ASME Section XI, Subsection IWE;* XI.S2, *ASME Section XI, Subsection IWL;* XI.S3, *ASME Section XI, Subsection IWF*	Revise footnote wording as shown: 10 CFR 50.55a is revised periodically to adopt, by reference, new editions, and addenda of the ASME Code. For each successive 120-month (10 year) inspection interval, applicants are required to revise the nuclear plant's ISI program to incorporate the requirements specified in the version of the ASME Code incorporated into 10 CFR 50.55a 12 months before the start of the inspection interval. Because a plant's 10 year ISI programs is based on the edition of the ASME Code when the ISI program is prepared, the ISI program based on any edition and addenda of the ASME Code adopted by the NRC in 10 CFR 50.55a is an acceptable aging management program that can be credited in a license renewal application as consistent with NUREG 1801 without justifying exceptions.	The footnote is based on ASME Section XI. The note discusses that the NRC adopts the use of updated versions of ASME XI in 10 CFR 50.55a but does not state that an applicant may credit the updated versions. The Bases Document for the revision to the GALL Report states that the addition of the code used in the plant's ISI program, which is based on 10 CFR 50.55a, can be used as an AMP in a LRA.	The staff did not agree with this comment (see XI.M1.1). The GALL Report was not revised to address the proposed change.
G.XI-S-2	XI.S7, RG 1.127, *Inspection of Water-Control Structures Associated*	Add conditional statement acknowledging use of structures monitoring program for certain structures for plants committed to RG 1.127.	Some plants committed to RG 1.127 already use structures monitoring program for certain structures (e.g., Intake Structure Concrete). The change will reduce the likelihood of exceptions to the	The staff agreed with this comment. The GALL AMP XI.S7 program description was revised to add the following: Even if plant is committed to RG 1.127, Revision 1, aging management of certain structures and components may be included

Table A.2.12: Disposition of NEI Comments on Chapter XI.S of the GALL Report

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	with Nuclear Power Plants		program.	in the Structures Monitoring Program (XI.S6).

Table A.2.13: Disposition of NEI Comments on Chapter 2 of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S.2-1	2.1.2.1	In this and other paragraphs, Revision 3 of NEI 95-10 is referenced. Draft Regulatory Guide (RG) DG-1140 (RG 1.188) references NEI 95-10, Rev. 5. This is a generic comment as Revision 3 is referenced in several sections of the SRP-LR.	Editorial	The staff agrees with this comment that Rev. 3 of NEI 95-10 is not the correct reference. As of June 2005, the RG 1.188 references NEI 95-10, Rev. 6 The SRP-LR was revised to address these proposed changes.
S.2-2	2.1.2.2	Change Regulatory Guide 1.1888 to Regulatory Guide 1.188.	Editorial	The staff agreed with this editorial comment. The SRP-LR was revised to address these proposed changes.
S.2-3	Table 2.1-4(a) and (b)	Table needs to be changed to match NEI 95-10 Rev.5 Table 4.1-1	Consistency	The staff agreed with this comment because NEI 95-10, Rev. 6 is the correct version and the SRP-LR Table should match this revision. The SRP-LR was revised to address these proposed changes.
S.2-4	Table 2.1-4(b)	In the Intended Function column, Electrical Continuity should not be bold type.	Editorial	The staff agreed with this editorial change. The SRP-LR was revised to address these proposed changes.

This Page Intentionally Left Blank

Table A.2.14: Disposition of NEI Comments on Chapter 3, Section 3.1, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S.3.1-1	3.1.2.2.2.1	Clarify intent of NRC Information Notice (IN) 90-04	Refer to comments for NUREG-1801 Vol. 2 Items IV.D1-16 and IV.D2-10. Discussion does not clearly convey the nature of the degradation mechanism, which is related to a very specific set of conditions, not to most SGs. IN 90-04 indicates that pitting corrosion on the surface served as corrosion fatigue crack initiation sites, not that pitting corrosion resulted in sufficient degradation to cause loss of component function. Further, this degradation mode has been limited to isolated cases of weld-zone cracking in Westinghouse Model 44 and 51 SGs, where a high stress region exists in the area of the shell to transition cone weld.	The staff agreed with this comment because this aging degradation is limited to a specific type of Westinghouse steam generators. The SRP-LR was revised to address these proposed changes.
S3.1-2	3.1.2.2.4.2	Delete redundant text	Editorial	The staff agreed with this editorial comment. The SRP-LR was revised to address these proposed changes.
S3.1-3	3.1.2.2.4.3	Delete mention of cyclic loading and loss of material	The subject of this item is cracking due to SCC and IGSCC. As such, requirements to augment AMP for cracking due to cyclic loading or for loss of material due to pitting and	The staff agreed with this comment because the information for cyclic loading and loss of material is included in other subsections as identified in Table 3.1-1. The SRP-LR was revised to address

Table A.2.14: Disposition of NEI Comments on Chapter 3, Section 3.1, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
			crevice corrosion do not belong or are addressed elsewhere. Firstly, cyclic loading of isolation condenser components is not an aging effect identified in NUREG-1801 Volume 2. Secondly, NUREG-1801 Vol. 2 Item IV.C1-6 (R-16) addresses LOM. Table 3.1.1, Item 5 (R-16) lists 3.1.2.2.2.2 as the applicable SRP-LR section and not 3.1.2.2.4.3.	these proposed changes.
S3.1-4	3.1.2.2.8	Delete “due to line” to correct sentence.	Editorial correction. Either delete words or determine what is missing from the 2nd sentence.	The staff agreed with this editorial comment. The extra words were deleted. The SRP-LR was revised to address these proposed changes.
S3.1-5	3.1.2.2.18	Eliminate specific fluence level	Editorial – fluence level is not required part of the description, neutron flux would be adequate terminology.	The staff agreed with this comment. The GALL Report was revised to address these proposed changes.
S3.1-6	Table 3.1-1	Odd page footers are for NUREG-1801.	Editorial	The staff agreed with this editorial comment The SRP-LR was revised to address these proposed changes.
S3.1-7	Table 3.1-1, Table 3.2-1, Table 3.3-1, Table 3.4-1 Note: This comment actually	When addressing Further Evaluation Recommended issues, avoid mixing internal and external environments for the same component. For example, Table 3.2-1, ID 2	Typically the plant-specific program applied to internal surfaces is not the same program as applied to external surfaces. Addressing the plant-specific programs to be used would be simplified if separate LRA discussions were permitted	The staff agreed with this comment for those tables where it applies. This comment is not applicable for Table 3.1-1. Each SRP-LR line-item should only address one type of environment, internal or external and the associated AMP recommended managing the aging effects.

Table A.2.14: Disposition of NEI Comments on Chapter 3, Section 3.1, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
	applies to the rollup Tables of GALL Volume 1., which then become the tables in the SRP	addresses “Steel components (including piping and ducting) exposed to external condensation or outside air, internally or externally to indoor uncontrolled air.” Table 3.2-1, ID 11 addresses “Steel piping, piping components, and piping elements (internal surfaces) and ducting closure bolting exposed to condensation (internal, treated water, or air –indoor uncontrolled (external).” In this case, the words “internally or” should be deleted from ID 1 and the word “external” should be replaced with “internal.” Of course the related items from NUREG-1801, Volume 2, that deal with external surfaces should point to ID 1; while those dealing with internal surfaces should point to ID 11. If the NUREG-1801, Volume 2, related items are unclear about which surface is being addressed, those items should be clarified.	for external and internal surfaces. The suggested changes would also eliminate a source of confusion regarding which surfaces are being addressed in GALL roll-up line-items.	See Appendix A.2.16 for applicability to Table 3.2-1; Appendix A.2.17 for Table 3.3-1. The SRP-LR was revised to address these proposed changes.
S.3.1-8	Table 3.1-1	Delete Loose Parts Monitoring and Neutron Noise rows from table.	These programs are not credited in GALL.	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.

This Page Intentionally Left Blank

Table A.2.15: Disposition of NEI Comments on Chapter 3, Section 3.2, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S3.2-1	Table 3.2-1, ID 2, 11 This is a generic comment applicable to Tables 3.2-1, 3.3-1, and 3.4-1, various IDs	When addressing Further Evaluation Recommended issues, avoid mixing internal and external environments for the same component. For example, Table 3.2-1, ID 2 addresses “Steel components (including piping and ducting) exposed to external condensation or outside air, internally or externally to indoor uncontrolled air.” Table 3.2-1, ID 11 addresses “Steel piping, piping components, and piping elements (internal surfaces) and ducting closure bolting exposed to condensation (internal, treated water, or air –indoor uncontrolled (external).” In this case, the words “internally or” should be deleted from ID 1 and the word “external” should be replaced with “internal.” Of course the related items from NUREG-1801, Volume 2, that deal with external surfaces should point to ID 1; while those dealing with internal surfaces should point to ID 11. If the NUREG-1801, Volume 2, related items are unclear about which surface is being addressed, those items should be clarified.	Typically the plant-specific program applied to internal surfaces is not the same program as applied to external surfaces. Addressing the plant-specific programs to be used would be simplified if separate LRA discussions were permitted for external and internal surfaces. The suggested changes would also eliminate a source of confusion regarding which surfaces are being addressed in GALL roll-up line-items.	The staff agreed with this comment for those tables where it applies. Each SRP-LR line-item should only address one type of environment, internal or external and the associated AMP recommended managing the aging effects. The SRP-LR was revised to address these proposed changes.

This Page Intentionally Left Blank

Table A.2.16: Disposition of NEI Comments on Chapter 3, Section 3.3, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S3.3-1	Table 3.3-1, IDs 10, 16, 17, 23, 28, 46, 47, 49, 50 This is a generic comment applicable to Tables 3.2-1, 3.3-1, and 3.4-1, various IDs	When addressing Further Evaluation Recommended issues, avoid mixing internal and external environments for the same component. For example, Table 3.2-1, ID 2 addresses “Steel components (including piping and ducting) exposed to external condensation or outside air, internally or externally to indoor uncontrolled air.” Table 3.2-1, ID 11 addresses “Steel piping, piping components, and piping elements (internal surfaces) and ducting closure bolting exposed to condensation (internal, treated water, or air – indoor uncontrolled (external).” In this case, the words “internally or” should be deleted from ID 1 and the word “external” should be replaced with “internal.” Of course the related items from NUREG-1801, Volume 2, that deal with external surfaces should point to ID 1; while those dealing with internal surfaces should point to ID 11. If the NUREG-1801, Volume 2, related items are unclear about which surface is being addressed, those items should be clarified.	Typically the plant-specific program applied to internal surfaces is not the same program as applied to external surfaces. Addressing the plant-specific programs to be used would be simplified if separate LRA discussions were permitted for external and internal surfaces. The suggested changes would also eliminate a source of confusion regarding which surfaces are being addressed in GALL roll-up line-items.	The staff agreed with this comment for those tables where it applies. Each SRP-LR line-item should only address one type of environment, internal or external and the associated AMP recommended managing the aging effects. Appendix A.2.16 addresses Table 3.2-1 IDs, and A.2.18 addresses Table 3.4-1 IDs. The SRP-LR was revised to address these proposed changes.

This Page Intentionally Left Blank

Table A.2.17: Disposition of NEI Comments on Chapter 3, Section 3.4, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S3.4-1	Table 3.4-1, IDs 3,5,11 This is a generic comment applicable to Tables 3.2-1, 3.3-1, and 3.4-1, various IDs	When addressing Further Evaluation Recommended issues, avoid mixing internal and external environments for the same component. For example, Table 3.2-1, ID 2 addresses "Steel components (including piping and ducting) exposed to external condensation or outside air, internally or externally to indoor uncontrolled air." Table 3.2-1, ID 11 addresses "Steel piping, piping components, and piping elements (internal surfaces) and ducting closure bolting exposed to condensation (internal, treated water, or air –indoor uncontrolled (external)." In this case, the words "internally or" should be deleted from ID 1 and the word "external" should be replaced with "internal." Of course the related items from NUREG-1801, Volume 2, that deal with external surfaces should point to ID 1; while those dealing with internal surfaces should point to ID 11. If the NUREG-1801, Volume 2, related items are unclear about which surface is being addressed, those items should be clarified.	Typically the plant-specific program applied to internal surfaces is not the same program as applied to external surfaces. Addressing the plant-specific programs to be used would be simplified if separate LRA discussions were permitted for external and internal surfaces. The suggested changes would also eliminate a source of confusion regarding which surfaces are being addressed in GALL roll-up line-items.	The staff agreed with this comment for those tables where it applies. Each SRP-LR line-item should only address one type of environment, internal or external and the associated AMP recommended managing the aging effects. Appendix A.2.16 addresses Table 3.2-1 IDs, and A.2.17 addresses Table 3.3-1 IDs. The SRP-LR was revised to address these proposed changes.

This Page Intentionally Left Blank

Table A.2.18: Disposition of NEI Comments on Chapter 3, Section 3.5, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S.3.5-1	SRP-LR 3.5	The changes marked in this section support the consolidation of tables in GALL Chapter III. NEI recommended reducing the number of sub-sections from 9 to 3.	The tables of Chapter III for the various structures and component supports are highly repetitive. To simplify these GALL tables, the nine structures tables have been consolidated into three tables. Tables A1, A2, A3, A4, A5, and A9 comprise a new Group 1 Structures Table; Table A6 becomes a new Group 2 Structures Table; and Tables A7 and A8 are joined to become a new Group 3 Structures Table. Similarly, the three ASME piping supports tables B1.1, B1.2 and B1.3 are combined as a table for supports for ASME piping and components and Class MC (BWR Containment Supports); and the remaining four tables have been combined as a table for all other supports (see also the endnotes to this table for NEI's presentation of general comment 1).	The staff did not agree with this comment to reduce the number of sub-sections from 9 to 3 because it does not meet the requirements of 10 CFR 54.21a (1), and it is not consistent with the format of GALL Chapter II. The SRP-LR was not revised to address these proposed changes.
S.3.5-2	Table 3.5-1, ID 24	NEI recommended the AMP column add on another alternative program as follow: Chapter XI.S6 "Structures Monitoring Program"	NEI proposed that change recognizes that the Structures Monitoring Program (SMP) is also commonly used for aging management of concrete in the water control structures.	The staff did not agree with this comment because the Core of Engineers guidelines for water-control structures are very specific. SMP is too general. However, staff agreed to provide this option in the description for AMP XI.S7, provided the necessary elements of XI.S7 are addressed. AMP XI.S7 was revised to address this change. See Appendix A.2.12 in NUREG-1832.

This Page Intentionally Left Blank

Table A.2.19: Disposition of NEI Comments on Chapter 3, Section 3.6, of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S.3.6-1	Sections 3.6.2.2.2, 3.6.2.2.3, and 3.6.2.2.4, and Sections 3.6.3.2.2, 3.6.3.2.3, and 3.6.3.2.4 on	These sections are noted as "Deleted." Rather than include these sections as they are presently annotated, delete them entirely.	Some applicants prefer to align the LRA section numbers of Further Evaluation Recommended items so that they correspond to the paragraphs in NUREG-1800. Including these deleted sections would make it more difficult and awkward to achieve one-to-one correspondence.	The staff agreed with this comment. The SRP-LR sections are revised.

This Page Intentionally Left Blank

Table A.2.20: Disposition of NEI Comments on Chapter 4 of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
S4.1-1	Table 4.1-3	Split up the multiple TLAAs listed in rows one and five of the table, i.e., Make “Low-temperature overpressure protection (LTOP) analyses,” “Flow induced vibration endurance limit,” transient cycle count assumptions,” and “ductility reduction of fracture toughness for the reactor vessel internals” separate lines on the table.	These TLAAs will be easier to address on a one-by-one basis, for example, by reference to a specific section of the LRA. Grouping them together has necessitated referencing multiple LRA sections for one line-item.	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.2-1	Section 4.2.2.1.2	Correct typographical error in last sentence.	Editorial	The staff agreed with this editorial comment. The SRP-LR was revised to address these proposed changes.
S4.2-2	Section 4.2.3.1.1.2.2	Provide flexibility in information provided for equivalent margins analysis	Many Applicants will not have fluence predictions at 1-inch, but rather at ¾-T. The applicant should provide the ¼-T and ¾-T data at the time of submittal. This is based upon the NRC’s request in an RAI for Farley.	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.3-1	Sections 4.3.1.1.1, 4.3.2.1.1.2, 4.3.3.1.1.2	Correct stated Code limit for CUF from “less than one” to “less than or equal to one.”	The Code, and many applicants CLB, allow for a CUF equal to unity over the service life.	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.3-2	Sections 4.3.2.1.2.2, 4.3.3.1.2.2	Allow for stress reduction factors that may differ from those in Table 4.3-1	The applicant’s code of record is bounding in their CLB. Table 4.3-1 appears to be appropriate for most cases, but it may not be for all cases.	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.3-3	Section 4.3.3.2.3	Provide flexibility for future references for environmental	Leaves room for improvement in the research into the	The staff agreed with this comment.

Table A.2.20: Disposition of NEI Comments on Chapter 4 of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		life correction factors by adding the phrase "or an approved technical equivalent."	phenomenon and improvements in calculational methods.	The SRP-LR was revised to address these proposed changes.
S4.5-1	Section 4.5.1	Clarify requirements for evaluating existing TLAA	10CFR54 does not require TLAAs to be created to address this aging effect; however analyses/calculations to address the aging effect of loss of prestress in containment tendons generally exist and generally meet the definition of a TLAA as given by 10CFR54.3.	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.5-2	Sections 4.5.2.1.1, 4.5.2.1.2, 4.5.3.1.2, Table 4.5-1	Update acceptance criteria – replace "predicted lower limit (PLL)" with "minimum required prestress force specified at anchorage"	The update meets the requirement per ASME Section XI, Sub-section IWL Acceptance criteria	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.5-3	Section 4.5.2.1.3	Acknowledge GALL as guidance rather than requirement.	ISG-1 was approved to implement this change	The staff agreed with this change because other sections of SRP-LR implemented ISG-1. The SRP-LR was revised to address these proposed changes.
S4.5-4	Section 4.5.3.1.3	Address evaluations outside GALL guidance	ISG 1	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.5-5	Section 4.5.6	Change Reference 4, NUREG-1801 July 2001, to NUREG-1801, Revision 1, September 2005	Editorial	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.
S4.5-6	Table 4.5-1	10 CFR 54.21(1)(i) and 10 CFR 54.21(1)(ii) Examples are repeat information, so it should be consolidated in one item.	Updated to meet the requirement per ASME Section XI, Sub-section IWL Acceptance criteria	The staff agreed with this change because the information is duplicated in two different rows, and could be combined.

Table A.2.20: Disposition of NEI Comments on Chapter 4 of SRP-LR

Comment Number	Item Number	Comment/ Proposed Change	Basis for Comment	NRC Disposition
				The SRP-LR was revised to address these proposed changes.
S4.6-1	Sections 4.6.1.1.1, 4.6.2.1.1.3, 4.6.3.1.1.3, Table 4.6-1	Correct stated Code limit for CUF from “less than one” to “less than or equal to one.”	Code allows CUF to be equal to 1.0 for the entire service life of the bellows. Many calculations on bellows are done to show that an extremely large number of the design cycles may be experienced without CUF = 1.0. In this case, there is no TLAA as the assumption is not based upon the original license term.	The staff agreed with this comment. The SRP-LR was revised to address these proposed changes.

This Page Intentionally Left Blank

APPENDIX B:

Disposition of Comments from the 520th Meeting of the NRC Advisory Committee on Reactor Safeguards (ACRS) held on March 4, 2005

B.1 INTRODUCTION

The NRC Advisory Committee on Reactor Safeguards (ACRS) held its 520th meeting on March 4, 2005 which included a presentation from staff addressing the planned changes to LRG documents. On April 6, 2005 the ACRS provided additional comments during its review of a draft SER for Millstone's License Renewal Application (LRA). Each of these comments has been evaluated, and the LRG documents have been revised, as needed, based on the staff's disposition of these comments.

B.2. EVALUATION AND DISPOSITION OF COMMENTS

Table B provides the evaluation and disposition for each of the ACRS comments.
The column heading "Comment Number" is primarily intended to provide the source of the comment, meaning the individual that made the comment. For example, ACRS-SHACK-1 indicates that the comment was made by the Dr. Shack and the "1" segregates this comment from all other comments he made.

B.3 REFERENCES

Official Transcript of the 520th Meeting of the Advisory Committee on Reactor Safeguards Proceeding, March 4, 2005. (ADAMs Accession No. ML05070048)

Official Transcript of Proceedings ACRST-3309, Advisory Committee on Reactor Safeguards Plant License Renewal Subcommittee, Wednesday, April 6, 2005. (ADAMS Accession # ML051110405)

Table B: Disposition of Comments from Transcript of 3/4/05 Review by NRC Advisory Committee on Reactor Safeguards (ACRS)				
Comment Number	**T-pg**	**Comment/ Proposed Change**	**Basis for Comment**	**NRC Disposition**
ACRS-Shack-01	53	Is there a link from the GALL Report programs to a related ISG (Interim Staff Guidance)?	Concern for traceability of the ISGs as they become incorporated into the LRG documents.	When incorporation of an ISG is made in the LRG documents it will be reflected in the basis document. The basis document will provide the link between the revised LRG documents and the original ISG.
ACRS-Wallace-02	72	Throughout this discussion and throughout the tables that have been presented, "criteria," the plural form of "criterion," is used incorrectly, will that be corrected?	Concern over proper grammar.	The staff reviewed the updated LRG documents to ensure that this term is used correctly.
ACRS - Rosen-01	110 and 157	As stated on p.110 of the transcript from the 4/6/05 ACRS Subcommittee review of the draft LR-SER for an applicant, the NRC staff was asked whether or not aging effects for halon and carbon dioxide fire suppression systems should be included. Later, to paraphrase the discussion on p.157 of the transcript from the 4/6/05 ACRS Subcommittee review of the draft LR-SER for this applicant, the staff was requested to clarify under what circumstances aging effects would be expected from halon/carbon dioxide in the fire suppression system and to make appropriate revisions to GALL.	The wording in the LR-SER (3.0.3.2.7 Fire Protection Program) about aging effects associated with the halon/carbon dioxide fire suppression system can lead to questions about clarity in the GALL AMPXI.M26 for fire protection.	The staff reviewed the LR-SER of concern and determined that it was not necessary to change any of the LRG documents on the basis of this comment. The guidance in GALL AMPXI.M26 is based on standards from the National Fire Protection Association (NFPA) for halon and carbon dioxide fire suppression systems. NFPA 12A: Standard on Halon 1301 Fire Extinguishing Systems, (last updated in 2004) provides safety requirements for designing, installing, testing, inspecting, approving, listing, operating, maintaining, decommissioning, and removing halon systems. NFPA 12: Standard on Carbon Dioxide Extinguishing Systems, (last updated in 2000) provides minimum requirements for installation and maintenance of carbon dioxide extinguishing systems and covers total flooding systems, local application systems, hand hose line systems, standpipe systems, and mobile supplies. The LRG documents were not revised to address this proposed change.
ACRS-Rosen-02	153	As stated on p. 153 of the transcript from the 4/6/05 ACRS Subcommittee review	It is not clear why the risk-informed in-service inspection programs are not being credited	The GALL Report contains acceptable approaches for managing aging effects for various SSCs within the scope of the license renewal rule. Provisions for the

Table B: Disposition of Comments from Transcript of 3/4/05 Review by NRC Advisory Committee on Reactor Safeguards (ACRS)

Comment Number	T-pg	Comment/ Proposed Change	Basis for Comment	NRC Disposition
		of the draft LR-SER for an applicant, the staff was requested to clarify why risk-informed ISI was not credited. Rosen said the staff needs to take that to heart and have another look at the GALL Report and maybe consider an ISG at some point.	as acceptable alternatives to conventional programs.	use of risk-informed ISI programs are being incorporated in the current licensing basis of existing plants, but similar application of risk-informed programs for license renewal were not included as part of 10 CFR 54. Should a licensee choose to utilize a risk-informed approach for ISI for license renewal, it will be required to provide the technical basis for its acceptability in order to satisfy the requirements of 10 CFR 54(a)(3). Available staff and other resource constraints currently prevent the development of an ISG to guide the use of risk-informed ISI, should license renewal applicants choose to apply such programs that are part of their current licensing basis. Risk-informed inservice inspection is an area of active interest at NRC. The staff will consider development of an ISG for the use of risk-informed ISI in license renewal applications as resources and other priorities allow.

T

his Page Left Intentionally Blank

APPENDIX C:

Disposition of Participant Comments from the License Renewal Public Workshop

C.1. INTRODUCTION

On March 2, 2005, the staff held a license renewal public workshop to obtain feedback and comments on the updated LRG documents which were issued for public comment on February 1, 2005 (70FR5254).

At this meeting, key staff members responsible for updating these LRG documents made presentations describing the process that was used to make changes to the LRG documents. Mr. David Lochbaum from the Union of Concerned Scientists made a presentation expressing his organization's concerns with the license renewal process, and representatives from the Nuclear Energy Institute presented information describing the comments they were making on the updated LRG documents. Additionally, county legislators from Westchester and Ulster Counties in New York made presentations identifying their concerns regarding the staff's review of a future license renewal application.

C.2. PARTICIPANT AFFILIATION

The participant list for the March 2, 2005 License Renewal Public Workshop is provided below. This is sorted alphabetically first by organizational affiliation and then by the first name of the attendee. Individuals who participated and whose comments are included in this appendix are noted by an asterisk (*) next to their name.

Participant	Affiliation
Wayne Lunsford	Alliance
Bob Kalinowski	American Electric Power – D.C. Cook
Massoud Tafazzoli	AREVA
Paul Crawley	Arizona Public Service – Palo Verde
Charles Willbanks	ATL Intl
David Wootten	Dominion Resources
Alan Cox	Entergy Nuclear
Garry Young	Entergy Nuclear
Jacque Lingenfelter	Entergy Nuclear
Reza Ahrabis	Entergy Nuclear
Roger Rucker	Entergy Nuclear
Fred Polaski	Exelon
Farideh Saba	ISL
Jon Woodfield	ISL
Kirayaku Kyn	JEPIC

Participant	Affiliation
Deann Raleigh	LIS Scientech
Kathryn Sutton	Morgan, Lewis & Bockius LLP
Fred Emerson *	NEI
Paul Genoa	NEI
Dennis Zannoni	The State of New Jersey
Brian Wohlers	NMC
Patrick Burke	NMC
Steven Schellin	NMC- PB
Darrel Turner	NMC - Palisades
Aida Rivera-Varina	NRC
Allision Black	NRC
Amar Pal	NRC
Amy Hull	NRC
Barry Elliot	NRC
Carolyn Lauron	NRC
Cayatano Santos	NRC
Chang Li	NRC
Chip Cameron	NRC
Daniel Merzke	NRC
David Jeng	NRC
Duc Nguyen	NRC
Frank Gillespie	NRC
Greg Cranston	NRC
Jake Zimmerman	NRC
Jerry Dozier	NRC
Johnny Eads	NRC
Jonathan Rowley	NRC
Juan Ayala	NRC
Kaihwa Hsu	NRC
Kamalakar Naidu	NRC
Ken Chang	NRC
Kimberley Corp	NRC
Kurt Cozens	NRC
Makuteswara Srinivasan	NRC
Mario Bonaca	NRC
Mark Lintz	NRC
Melissa Jenkins	NRC
Michael Waterman	NRC

Participant	Affiliation
Naeem Iqbal	NRC
Pao- Tsin Kuo	NRC
Peter Kang	NRC
Ram Subbaratnam	NRC
Samson Lee	NRC
Steve Hoffman	NRC
Steve West	NRC
Tomeka Terry	NRC
Zahira Cruz	NRC
Dan Naus	ORNL
Al Baione	Parallax
Russell Wells	Parallax
Eric Blocher	Parsons Energy & Chemical :
John Oddo	PPL
Michael B. Detamore	PPL
Roger Stewart	Progress Energy
Chalmer Myer	Southern Nuclear
Mike Macfarlane	Southern Nuclear
Partha Ghosal	Southern Nuclear
Tom Greene	Southern Nuclear
David Lochbaum *	UCS
Brian Shapiro *	Ulster County Legislature
Susan Zimet *	Ulster County Legislature
Michael Kaplowitz *	Westchester County Legislature, NY
Tara Bernard *	Westchester County Legislature, NY
Todd Anselmi	Wolf Creek Nuclear Operating Corp.
John Bowen	WPI

C.3. EVALUATION AND DISPOSITION OF COMMENTS

Table C contains comments provided by the participants at the workshops. The column heading “Commenter and Affiliation” is primarily intended to provide the source of the comment, meaning the individual and his/her affiliated organization that submitted the comment. For example, Emerson -1, NEI, indicates that the comment was made by Mr. Emerson of NEI and the “1” segregates this comment from other comments made by that individual.
This table is sorted by the page number where the comment appeared in the meeting’s transcript.

C.4. REFERENCES

Official Transcript of the Workshop on Revised License Renewal Guidance Documents, March 2, 2005. (ADAM Accession No. ML050750296)

Table C: Disposition of Comments from License Renewal Public Workshop				
Comment Number	**T-pg**	**Comment/ Proposed Change**	**Basis for Comment**	**NRC Disposition**
Lochbaum-1, UCS	43	We will be probably providing some written comments very similar to this effect by the end of the month for the process.	To supplement the presentations made at the public workshop, formal comments will be provided.	Mr. Lochbaum has written a book that identifies, in detail, the concerns he expressed at the meeting. The topics presented in this book were identified and responded to in Appendix D, Table D.2. These topics are identified by the number eight (8) following the comment identifier.
Emerson-1, NEI	47	At the end of the comment period, at the end of March, we'll provide more detailed comments which are going to be provided in a manner that will help the staff address the issues that we think need to be addressed to improve the process.	In addition to the comments provided during this public workshop, formal comments will be provided.	Appendix A to this NUREG contains the NEI comments and corresponding staff dispositions.
Legislators from Westchester and Ulster Counties, NY.-1	201	Expressed concern with the prospect of NRC approving the future license renewal applications of the Indian Point commercial nuclear power plant licenses.	Legislators provided positions that are contained in the workshop transcript.	The purpose of this public workshop was to solicit specific comments on the draft changes to the LRG documents provided on January 31, 2005. The comments provided by these legislators were broader license renewal issues and outside the scope of the proposed updated LRG documents.

This Page Left Intentionally Blank

APPENDIX D:
Disposition of Written Public Comments

D.1. INTRODUCTION

On February 1, 2005, the updated LRG documents were made available for public comment on the NRC web site. The public was requested to submit comments on Draft Regulatory Guide DG-1104, the draft SRP-LR, and the draft GALL Report by March 31, 2005.

D.2. ORIGIN OF WRITTEN PUBLIC COMMENTS

As provided in the following listing, eight written public comments were submitted during the public comment period. This listing below provides the name of the person providing the comment, his/her affiliation, and the location of the complete text of the comment. An identifier is also provided to associate the particular comment with the more detailed comment evaluation contained in Table D.

Identifier	Commenter	Affiliation	ADAMS Accession No.
(1)	Malherek, J. P.	Public Citizen	ML050880209
(2)	Boyd, J	California Energy Commission	ML050900222
(3)	Becker, R Blanch, P Epstein, E Huang, A Lampert, M May, D	Alliance for Nuclear Responsibility, TMI-Alert, Environmental Health Coalition, Pilgrim Watch, California Earth Corps	ML050960394
(4)	Van Suntum – Rainwater, L	Riverkeeper	ML050960340
(5)	Swanson, J	San Luis Obispo Mothers for Peace	ML050960341
(6)	Adams, M Schumann, K	Public	ML050960343
(7)	Spano, A	Westchester County	ML051510238
(8)	Lochbaum, D	Union of Concerned Scientists*	ML050540351

*The Union of Concerned Scientists comments are extracted from the publication, "U.S. Nuclear Plants in the 21st Century, The Risk of a Lifetime."

D.3. EVALUATION AND DISPOSITION OF COMMENTS

Table D contains a summary of the comments received from the stakeholders identified in the above table, along with the staff's disposition of these comments. The column labeled "Comment Number," is primarily intended to identify the source of the comment (i.e., the organization or individual that submitted the comment).

Comments are summarized according to general topics. If the comment is outside the scope of project to update the LRG documents, the comment is acknowledged, but a detailed evaluation is not performed. Comments with similar specific objectives are also combined to capture the common essential issues that had been raised, and the identifier of the commenter (provided in the above table) is placed in parenthesis. If more than one commenter made a similar comment on the topic, then there will be several identifiers for each of the commenters following the comment number.

Table D: Disposition of Written Public Comments		
Comment Number	**Comment/ Proposed Change**	**NRC Disposition**
P-G-1 (1)	Regarding institutional independence, Safety Review information is based on information provided by the applicant. The commenter stated that “unless the NRC has the capacity to conduct its own safety reviews and develop its own guidelines for considering license applications, citizens cannot be assured that the NRC is serving the interest of the public and not that of industry.”	The NRC adheres to the principles of good regulations as provided on the NRC Website at http:/www.nrc.gov/who-we-are/values.html. The following provides the NRC values regarding independence: “Nothing but the highest possible standards of ethical performance and professionalisms should influence regulation. However, independence does not imply isolation. All available facts and opinions must be sought openly from licensees and other interested members of the public. The many and possibly conflicting public interests involved must be considered. Final decisions must be based on objective, unbiased assessments of all information, and must be documented with reasons explicitly stated.” NEI and public comments were considered and used in the initial and subsequent development of the license renewal guidance documents, including this revision to the LRG documents. However, the NRC staff independently developed its own technical information and research for the license renewal guidance documents. As identified in the background to the GALL Report, the technical information was derived primarily from independent NRC documents and reports developed by the staff, government laboratories under contract to NRC, and other contractors to the NRC. Specifically, the GALL Report (NUREG-1801) was first published in 2001 and was based on a previous report, NUREG/CR-6490, “Nuclear Power Plant Generic Aging Lessons Learned (GALL).” NUREG/CR-6490 represents a systematic compilation of plant aging information. The NUREG/CR-6490 report was based on information gathered from over 500 documents: • Nuclear Plant Aging Research (NPAR) program reports sponsored by the NRC Office of Nuclear Regulatory Research, • licensee event reports (LERs) submitted to the NRC, • NRC generic letters, • NRC bulletins, • NRC information notices, and • Nuclear Management and Resources Council (NUMARC, now NEI) industry reports addressing license renewal for major structures and components. The staff also considered information contained in the reports provided by the Union of Concerned Scientists (UCS). Many of these reports are available in ADAMS and the NRC

Table D: Disposition of Written Public Comments		
Comment Number	**Comment/ Proposed Change**	**NRC Disposition**
		website at: http://www.nrc.gov/reactors/operating/licensing/renewal/guidance.html. The GALL Report expands upon the information in NUREG/CR-6490 to provide an evaluation of the adequacy of aging management programs for license renewal.
P-G-2 (1)(3)(5)(6)	Concern that NRC might conduct review of license renewal application on a generic rather than plant-specific basis	A plant-specific evaluation is performed by the applicant, submitted to, and reviewed by the staff. The staff conducts plant-specific audits and reviews of the applicant's license renewal application. This plant-specific process is described in 10 CFR Part 54 and on the NRC website at http://www.nrc.gov/reactors/operating/licensing/renewal.html.
P-G-3 (2)	The guidance documents do not focus sufficiently on the equally important human factors, for example, the "safety culture" of a plant	The NRC is proactive in this area and is not waiting until the period of extended operation before addressing these topics. The Commission has provided guidance to the staff in SECY-04-0111, "Recommended Staff Actions Regarding Agency Guidance in the Areas of Safety Conscious Work Environment and Safety Culture" and the SRM-SECY-04-0111, "NRC Staff Requirements - SECY-04-0111 - Recommended NRC Staff Actions Regarding Agency Guidance in the Areas of Safety Conscious Work Environment and Safety Culture." These documents are available in ADAMS Accession numbers ML041750238 and ML042430661, respectively. More information in this area is available on the Human Factors web page at http://www.nrc.gov/reactors/operating/ops-experience/human-factors.html
P-G-4 (2)	The NRC should review the Columbia Accident Investigation Board's conclusions and recommendations	The staff has reviewed and taken into consideration the Columbia Accident Investigation Board's conclusions and recommendations that are relevant to the NRC. For example, the NRC's Inspection Program Branch developed a web-based training course (provided in ADAMS at Accession Number ML040440475) based on the Columbia Space Shuttle accident to: (1) illustrate the importance of maintaining a questioning attitude toward safety and the potential negative consequences that can occur when such a questioning attitude is lost or compromised; (2) provide examples of how issues concerning an organization's safety culture can lead to technological failures; (3) provide insights into investigation techniques that can be used to assess safety significant issues or events; and (4) illustrate the importance of a robust corrective action program and highlight the corrective action program weaknesses that contributed to the shuttle accident.

Table D: Disposition of Written Public Comments

Comment Number	Comment/ Proposed Change	NRC Disposition
P-G-5 (2)	NRC should: (1) revise how it assesses plant performance and early indications of deteriorating safety at a plant, (2) establish a more specific methodology for deciding to shut down a plant, (3) establish management controls for systematically tracking actions that a plant has taken in response to incidents, and (4) encourage programs to air differing professional opinions and advice about plant safety and security.	The staff acknowledges this comment. However, it is a recommendation related to current plant operations, which the NRC inspects as part of the ongoing Reactor Oversight Process (ROP). Accordingly, the comment does not relate to the license renewal guidance documents being revised, and is not appropriately addressed in this context. More Information on the reactor oversight process is available on the NRC Website at http://www.nrc.gov/reactors/operating/oversight.html#power
P-G-6(8)	Specific operating experience should be considered when updating the GALL Report.	In general, the operating experience was considered in the update of the GALL Report. In particular, the AMR line-items were verified to be in the GALL Report for the specific operating experience identified in the UCS report relating to the Oconee, Quad Cities, Summer, and Indian Point facilities.
P-G-7(2)	Safety and environmental issues should be reviewed, evaluated and an opportunity provided for state and local comment during the license renewal review process, if and when these licensees apply for license renewal.	The NRC license renewal process does provide the opportunity for formal public participation with respect to both safety and environmental matters. In addition, the staff affords the public opportunities to comment on the scope of the environmental review for individual applications and on the staffs draft supplemental environmental impact statements on those applications. More information regarding the license renewal process is available at the NRC Website at http://www.nrc.gov/reactors/operating/licensing/renewal/overview.html
P-G-8(3)(4)(6)(7)(8)	Criteria for license renewal process should be equivalent to regulations for a new reactor	The current licensing bases of each operating plant are maintained for the period of extended operation. Specifically, as provided in the Statements of Consideration for the License Renewal Rule: "Reasonable assurance that the function of important systems, structures, and components will be maintained throughout the renewal period, combined with the rule's stipulation that all aspects of a plant's CLB (e.g., technical specifications) and the NRC's regulatory process carry forward into the renewal period, are viewed as sufficient to conclude that the CLB (which

Table D: Disposition of Written Public Comments

Comment Number	Comment/ Proposed Change	NRC Disposition
		represents an acceptable level of safety) will be maintained." License renewal requirements, established as part of the 10 CFR Part 54 license renewal rulemaking, contain the requirements for the NRC to issue license amendments which allow the extension of a plant's life by up to 20 years.
P-G-9(2)(3)(5)(7)	Security issues have not changed since existing nuclear plants were licensed – most over 20 years ago	The NRC promulgated regulations and guidance on plant security well before September 11, 2001, and has moved quickly and aggressively to further enhance security in light of the increased threat since then. These enhancements will be implemented well before the license renewal period. Nuclear facility structures are designed to withstand extreme events such as hurricanes, tornadoes, and earthquakes. Nevertheless, the events of September 11 have resulted in additional protections at nuclear power plants and enhanced coordination with Federal, State and local organizations responsible for protecting critical national infrastructure to ensure that these commercial facilities remain secure. Following the September 2001 terrorist attacks, the NRC immediately advised nuclear facilities to go to the highest level of security in accordance with the system in place at the time. Since then, a series of Advisories, Orders, and Regulatory Issue Summaries have been issued to further strengthen security at NRC-licensed facilities including power reactors, decommissioned reactors, independent spent fuel storage installations, research and test reactors, uranium conversion facilities, gaseous diffusion plants, fuel fabrication facilities, and certain sites at which radioactive materials are used and in the transportation of spent fuel and radioactive materials. Details of the specific actions are sensitive, but for facilities such as power reactors, they generally include: ▪ increased patrols, ▪ augmented security forces and capabilities, ▪ additional security posts, ▪ installation of additional physical barriers, ▪ vehicle checks at greater stand-off distances, ▪ enhanced coordination with law enforcement and military authorities; ▪ more restrictive site access controls for personnel; and ▪ expanded, expedited, and more thorough employee background checks. For power reactors and fuel fabrication facilities having significant quantities of nuclear

Table D: Disposition of Written Public Comments

Comment Number	Comment/ Proposed Change	NRC Disposition
		material, facility owners were required in April 2003 to revise the physical security plans, guard training and qualification plans, and contingency plans. The NRC reviewed these plans and the owners implemented them by October 2004.
P-G-10(2) (3) (4)(5) (6)(7)	License Renewal will increase Radioactive Waste	The safety and environmental effects of long-term storage of spent fuel onsite have been evaluated by the NRC, and as set forth in the Waste Confidence Rule, the NRC generically determined that such storage could be accomplished without significant environmental impact. In the Waste Confidence Rule, the Commission determined that spent fuel can be stored onsite for at least 30 years beyond facility licensed operating life, which may include the term of a renewed license. At or before the end of that period, the fuel would be moved to a permanent repository. The Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants (NUREG -1437) is based upon the assumption that storage of the spent fuel onsite is not permanent in accordance with the Waste Confidence Rule.
P-G-11 (3) (6)(7)(8)	Safety problems in the current license renewal term are not considered in the license renewal period	The NRC monitors safety performance in the current operating license term through the reactor oversight process (ROP). The NRC will not delay addressing current safety issues until the period of extended operation. The ROP will continue into the license renewal period to ensure appropriate corrective actions, root cause analyses, and actions to prevent recurrence are implemented, as required. Appropriate action for violations of NRC requirements, such as findings, fines, and/or shutdown by the NRC will continue in the current term as well as the license renewal period.
P-G-12 (2)(3) (4) (6)(7)	Emergency Planning needs to be considered for license renewal	Emergency Preparedness (EP) is a current operating issue that is aggressively being addressed by the NRC during the current operating license term. The oversight of emergency preparedness will also be carried out into the period of extended operation. In accordance with the response to Comment P-G-8, the NRC's regulatory process is sufficient to conclude that the EP portion of the current licensing basis, among other things, will be maintained during the period of extended operation. The NRC performs oversight of emergency preparedness through performance indicators and through inspection. NRC inspectors dedicate thousands of hours to routine inspections, observations of drill and exercises, review of licensee corrective actions, as well as emergency plan changes. In addition, licensees are required to conduct a full-scale exercise involving Federal, State, and local agencies every two years. These exercises are evaluated by the NRC and FEMA. The results and, if necessary, enforcement of these emergency preparedness oversight activities are available for public review and can be found on the NRC Operating Reactor Oversight Web page.

Table D: Disposition of Written Public Comments		
Comment Number	**Comment/ Proposed Change**	**NRC Disposition**
P-G-13 (2)(3) (4) (6)	Extending the reactor operating license impacts the environment	Each license renewal applicant must include a supplement to the environmental report that contains an analysis of the plant's impact on the environment if allowed to continue operation beyond the initial license. The NRC performs plant-specific reviews of environmental impacts of operating life extension in accordance with the National Environmental Policy Act (NEPA) and the requirements of 10CFR Part 51 "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." This review continues on a separate "track" from the safety reviews of the technical information. Environmental requirements for the renewal of power reactor operating licenses are contained in the NRC regulations in 10 CFR Part 51.
P-G-14 (2)(3) (6)	Workshops and public meetings on license renewal are not held in the vicinity of the plants to allow public participation and comment	Public Meetings have occurred in the vicinity of license renewal applicant's power plants to allow convenient public participation in the license renewal process. The public also participates by written comments during the formal public comment period on the draft environmental impact statement. This license renewal process is described on the NRC license renewal Website at http://www.nrc.gov/reactors/operating/licensing/renewal.html.
P-G-15(4)	NRC should evaluate Moving Parts for License renewal	As provided in the statements of consideration for the License Renewal Rule: " In June 1993, the NRC issued Regulatory Guide 1.160 "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." The regulatory guide provides an acceptable method for complying with the requirements of the maintenance rule and states that a licensee can use alternative methods if the licensee can demonstrate that these alternative methods satisfy the requirements of the rule. Because aging is a continuous process, the Commission has concluded that existing programs and regulatory requirements that continue to be applicable in the period of extended operation and provide adequate aging management for systems, structures, and components should be credited for license renewal. Accordingly, the amendment to the license renewal rule focuses the renewal review on plant systems, structures, and components for which current activities and requirements may not be sufficient to manage the effects of aging in the period of extended operation." The Commission determined that, at this time, there was not an adequate basis to generically exclude passive, long-lived structures and components from an aging management review. Thus, the license renewal process focuses on passive long-lived structures and components.
P-G16(5)	There is a severe shortage of	The nuclear industry and the NRC are aware of the problems associated with an aging

Table D: Disposition of Written Public Comments

Comment Number	Comment/ Proposed Change	NRC Disposition
	trained workers available to replace the aging workforce	workforce and are acting upon it to ensure staff resources are adequate through hiring and training processes. For example, as provided in SECY-01-0196, the Electric Power Research Institute (EPRI) is pursuing research on methods for enhancing knowledge management as a tool for capturing and accessing the knowledge of experts who are leaving the industry. However, since this comment is not directed to plant systems, structures, and components covered by 10 CFR Part 54 and the guidance in the GALL Report, it is not within the scope of the license renewal guidance update.
P-G-17(6)	Instead of license Renewal, focus on Renewable Resources	Consideration of other generation technologies are typically discussed in the NRC staff's Environmental Impact Statement. For example, in chapter 8 of Ginna's SEIS regarding the Ginna Nuclear Power Plant (NUREG-1437, supplement 14), the staff describes the environmental impact associated with alternative sources of electric power to replace the power generated by Ginna, assuming that the OL is not renewed. The Ginna SEIS states that, "Alternative technologies are not considered feasible at this time for replacement of the Ginna base-load power and it is very unlikely that the environmental impacts of any reasonable combination of generation and conservation options could be reduced to the level of impacts associated with renewal of the Ginna operating licenses." This EIS is provided on the NRC Website at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/supplement14/sr1437s14.pdf
P-G-18(7)	Plant-specific Comments regarding individual plants	Specific comments regarding individual licensees license renewal applications have been or will be addressed when the applicant applied or applies for license renewal
P-G-19(2) (7)	The NRC must broaden the issues it considers in its license extension decisions (security, emergency planning, etc.)	The purpose of the public comment period was to comment on the update of the license renewal guidance documents. These documents are based on current regulations provided in 10 CFR Part 54. Some of the comments received in response to the January 31, 2005, Federal Register notice solicitation (65FR53047) on license renewal misinterpreted the purpose of the comment period by interpreting it as an opportunity to comment on relicensing requirements for nuclear power reactors beyond the current regulations found in 10 CFR Part 54. The public comments included a wide range of topics such as "Terrorism," and a suggestion to make requirements for relicensing comparable to those for licensing new reactors. These issues are not directly related to the update of the license renewal guidance document and many would involve a change in NRC regulations. The process of developing or modifying NRC regulations is called rulemaking. Rulemaking is most often initiated by the staff, although any member of the public may also petition the NRC to develop, change, or rescind one of its regulations. More information is available on public

Table D: Disposition of Written Public Comments

Comment Number	Comment/ Proposed Change	NRC Disposition
		involvement in rulemaking on the NRC website at: http://www.nrc.gov/what-we-o/regulatory/rulemaking.html Since these comments are not directly related to the update of the license renewal guidance documents, they do not warrant any further response.
P-G-20(8)	perform inspections of areas considered less vulnerable to aging degradation	The staff agreed with this comment. This is the purpose of the one-time inspection AMP. As provided in the introduction to this AMP, the One-time Inspection program includes measures to verify the effectiveness of an aging management program (AMP) and confirm the absence of an aging effect. As a plant will have accumulated at least 30 years of use before inspections under this program begin, sufficient time will have elapsed for aging effects, if any, to be manifested. There are situations in which additional confirmation is appropriate. These include (a) an aging effect is not expected to occur but the data is insufficient to rule it out with reasonable confidence; (b) an aging effect is expected to progress very slowly in the specified environment, but the local environment may be more adverse than that generally expected; or (c) the characteristics of the aging effect include a long incubation period. For these cases, a holder of a renewed license will confirm that either the aging effect is indeed not occurring, or the aging effect is occurring very slowly so as not to affect the component or structure intended function during the period of extended operation. A one-time inspection may be used to provide additional assurance that aging that has not yet manifested itself is not occurring, or that the evidence of aging shows that the aging is so insignificant that an aging management program is not warranted. A one time inspection may also trigger development of a program necessary to assure component intended functions through the period of extended operation. The AMP XI.M32 and several AMR line-items have been enhanced to address this comment.
P-G-20(8)	Perform the right inspection technique for the appropriate degradation mechanism	The staff agrees with this comment. AMP XI.M32 was enhanced with a table providing a table of mechanisms with acceptable inspection techniques to provide guidance to the applicants. The AMP XI.M32 was enhanced to address this comment.

APPENDIX E:
Aging Management Review Line-item Comparison

E.1. Purpose and Use of the Comparison Table

The aging management reviews defined in Volume 2 of NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” present acceptable methods of managing aging effects. Each aging management review (AMR) line-item from NUREG-1801 identifies the component, material, environment, and aging effect, along with the corresponding aging management program. A unique AMR line-item may be used multiple times.

This Appendix is intended to facilitate identification of the changes made to the AMR line-items in NUREG-1801 in response to comments from the public and the industry. In this Appendix, each unique AMR line-item from the January 2005 GALL Report is presented above the corresponding line-item from September 2005 GALL Report, where possible. If the January 2005 line-item was not retained, or if a new item was added to the September 2005GALL Report, this is noted in the table. Shading has also been added to the September 2005 line-items to facilitate the comparison.

Each unique September 2005 AMR line-item in Table E has a unique coded identifier, such as C-01 or R-152. Tables 1A, 2A, 3A, 4A, 5A and 6A of Volume 1 of NUREG-1801 identify where each of these unique line-items are used in Volume 2 of NUREG 1801.

To facilitate the presentation of the unique AMR line-items, an ID column not shown in the GALL AMR tables has been added to Table E, and two other column headings were shortened due to table spacing considerations. The ID column was added to identify which GALL Report Chapter contains the AMR line-item. The two column heading changes are as follows:

AMR Line-item Heading	Table E Heading
Structure and/or Component	S/C
Environment	Environ

Additionally, the unique AMR line-items presented in Table E were obtained from a Microsoft Excel spreadsheet that was used to develop the AMR tables in NUREG-1801 in Microsoft Word. The special codes are included in the spreadsheet to represent carriage returns, which provide proper vertical alignment of the text within each row once the text is transferred from the spreadsheet into Word. In Table E, these special characters were removed and not replaced with carriage returns in order to facilitate the presentation of the unique AMR line-item information for comparison. Consequently, some cells in Table E do not include the vertical alignment that exists in the NUREG-1801 AMR line-items. For example, the following sample AMR “Further Evaluation” column text illustrates this alignment difference:

NUREG-1801 AMR Table	Table E
Yes, if corrosion is significant for inaccessible areas No No	Yes, if corrosion is significant for inaccessible areas No No

This Page Intentionally Left Blank

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-01	A1.1-a A2.2-a B3.2.1-a	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S2, "ASME Section XI, Subsection IWL"Accessible areas:Inspections performed in accordance with IWL will indicate the presence of loss of material (spalling, scaling) and cracking due to freeze-thaw.Inaccessible Areas:Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557). Documented evidence confirms that where the existing concrete had air content of 3% to 6%, subsequent inspection did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation.The weathering index for the continental US is shown in ASTM C33-90, Fig. 1.	No, if stated conditions are satisfied for inaccessible areas
II	C-01	A1.1-a	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S2, "ASME Section XI, Subsection IWL"Accessible areas:Inspections performed in accordance with IWL will indicate the presence of loss of material (spalling, scaling) and surface cracking due to freeze-thaw.Inaccessible Areas:Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557). Documented evidence confirms that where the existing concrete had air content of 3% to 6%, subsequent inspection did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation.The weathering index for the continental US is shown in ASTM C33-90, Fig. 1.	Yes, for plants located in moderate to severe weathering conditions

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-02	A1.1-b A2.2-b B2.2.1-a B3.1.2-a B3.2.1-b	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Water – flowing	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL”Accessible areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.Inaccessible Areas:. An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	No, if concrete was constructed as stated for inaccessible areas
II	C-02	A1.1-b	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Water – flowing	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL”Accessible areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.Inaccessible Areas:An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas
II	C-03	A1.1-c A2.2-c B2.2.1-b B3.1.2-b B3.2.1-c	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Aggressive environment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible Areas:Examination of representative samples of below-grade concrete, when excavated for any reason, is to be performed, if the below-grade environment is aggressive (pH < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is	Yes, if environment is aggressive

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
							aggressive or non-aggressive.	
II	C-03	A1.1-c	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Ground water/soil	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL".Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, surface cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-04	A1.1-d A2.2-d B2.2.1-c B3.1.2-c B3.2.1-d	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Any	Expansion and cracking/ reaction with aggregates	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of cracking due to reaction with aggregates.Inaccessible Areas:Evaluation is needed if testing and petrographic examinations of aggregates performed in accordance with ASTM C295-54, ASTM C227-50, or ACI 201.2R-77 (NUREG-1557) demonstrate that the aggregates are reactive.	No, if stated conditions are satisfied for inaccessible areas
II	C-04	A1.1-d	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Any	Cracking due to expansion/ reaction with aggregates	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking due to reaction with aggregates.Inaccessible Areas:As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77.Therefore, if these conditions are satisfied, aging management is not necessary.	Yes, if concrete was not constructed as stated for inaccessible areas

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-05	A1.1-e A2.2-e B2.2.1-d B3.1.2-d B3.2.1-e	Concrete: Dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S2, "ASME Section XI, Subsection IWL".Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible Areas:Examination of representative samples of below-grade concrete, when excavated for any reason, is to be performed, if the below-grade environment is aggressive (pH < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is aggressive or non-aggressive.	Yes, if environment is aggressive
II	C-05	A1.1-e	Concrete: Dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air – outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S2, "ASME Section XI, Subsection IWL".Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-06	A1.1-f A2.2-f B2.2.1-e B3.1.2-e B3.2.1-f	Concrete elements; All	Concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, "Structures Monitoring Program"The initial licensing basis for some plants included a program to monitor settlement. If no settlement was evident during the first decade or so, the NRC may have given the licensee approval to discontinue the program. However, if a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program
II	C-06	B2.2.1-e B3.2.1-f B1.2.	Concrete elements; All	Concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, "Structures Monitoring Program"If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon
II	C-07	A1.1-g A2.2-g B2.2.1-f B3.1.2-f B3.2.1-g	Concrete: Foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction in foundation strength, cracking, differential settlement/ erosion of porous concrete subfoundation	Chapter XI.S6, "Structures Monitoring Program"Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-07	A1.1-g A2.2-g B2.2.1-f B3.1.2-f B3.2.1-g B1.2.	Concrete: Foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction in foundation strength, cracking, differential settlement/ erosion of porous concrete subfoundation	Chapter XI.S6, “Structures Monitoring Program”Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant’s structures monitoring program or a de-watering system is relied upon
II	C-08	A1.1-h A2.2-h B2.2.1-g B3.1.2-g B3.2.1-h	Concrete Dome; wall; concrete fill-in annulus, basemat; ring girder; buttresses	Concrete	Air – indoor uncontrolled or air - outdoor	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programThe implementation of 10 CFR 50.55a and IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made.Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	Yes, if applicable

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-08	A1.1-h	Concrete: Dome; wall; basemat; ring girder; buttresses	Concrete	Air – indoor uncontrolled or air – outdoor	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programThe implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus of elasticity due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made.Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	Yes, if temperature limits are exceeded

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-09	A1.2-a A2.1-a B3.2.2-a	Steel elements: Liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE”For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied:Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is necessary.Chapter XI.S4, “10	Yes, if corrosion is significant for inaccessible areas NoNo

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-09	A1.2-a A2.1-a B3.2.2-a	Steel elements: Liner;Liner anchors;Integral attachments	Steel	Air – indoor uncontrolled	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE”For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied:1. Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. 2. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. 3. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements. 4. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.If any of the above conditions cannot be satisfied, then a plant-specific aging management program fo	Yes, if corrosion is significant for inaccessible areas No
II	C-10	A1.3-a B2.2.3-a	Prestressing system:Tendons; anchorage components	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S2, “ASME Section XI, Subsection IWL”	No
II	C-10	A1.3-a B2.2.3-a	Prestressing system:Tendons; anchorage components	Steel	Air – indoor uncontrolled or air – outdoor	Loss of material/ corrosion	Chapter XI.S2, “ASME Section XI, Subsection IWL”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-13	A3.1-b B2.1.1-c B4.1-b	Penetration sleeves;penetration bellows	Steel; Stainless steel; Dissimilar metal welds	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, “Containment Liner Plate and Penetration Fatigue Analysis” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
II	C-13	A3.1-b B4.1-b	Penetration sleeves;Penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled or air – outdoor	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, “Containment Liner Plate and Penetration Fatigue Analysis” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
II	C-14	A3.1-c B2.1.1-b B4.1-c	Penetration sleeves;penetration bellows	Steel; Stainless steel; Dissimilar metal welds	Air – indoor uncontrolled	Cracking/ cyclic loading(CLB fatigue analysis does not exist)	Chapter XI.S1, “ASME Section XI, Subsection IWE ” and Chapter XI.S4, “10 CFR Part 50, Appendix J”Evaluation of 10 CFR 50.55a/IWE is augmented as follows:(4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated
II	C-14	A3.1-c B4.1-c	Penetration sleeves;Penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled or air – outdoor	Cracking/ cyclic loading(CLB fatigue analysis does not exist)	Chapter XI.S1, “ASME Section XI, Subsection IWE ” and Chapter XI.S4, “10 CFR Part 50, Appendix J”Evaluation of 10 CFR 50.55a/ASME Section XI, Subsection IWE is to be supplemented to consider the following:(4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-15	A3.1-d B4.1-d	Penetration sleeves;penetration bellows	Stainless steel; dissimilar metal welds	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”Evaluation of 10 CFR 50.55a/IWE is augmented as follows:(4) Detection of Aging Effects:Transgranular Stress corrosion cracking (TGSCC) is a concern for dissimilar metal welds. In the case of bellows assemblies, SCC may cause aging effects particularly if the material is not shielded from a corrosive environment. Subsection IWE covers inspection of these items under examination categories E-B, E-F, and E-P (10 CFR Part 50, Appendix J pressure tests). 10 CFR 50.55a identifies examination categories E-B and E-F as optional during the current term of operation. For the extended period of operation, Examination Categories E-B & E-F, and additional appropriate examinations to detect SCC in bellows assemblies and dissimilar metal welds are warranted to address this issue.(10) Operating Experience:IN 92-20 describes an instance of containment bellows cracking, resulting in loss of leak tight	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-11	A1.3-b B2.2.3-b	Prestressing system:Tendons; anchorage components	Steel	Air – indoor uncontrolled or air - outdoor	Loss of prestress/ relaxation; shrinkage; creep; elevated temperature	Loss of tendon prestress is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation.See the Standard Review Plan, Section 4.5, "Concrete Containment Tendon Prestress" for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii). See Chapter X.S1 of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii).For periodic monitoring of prestress, see Chapter XI.S2.	Yes,TLAA
II	C-11	A1.3-b B2.2.3-b	Prestressing system:Tendons	Steel	Air – indoor uncontrolled or air – outdoor	Loss of prestress/ relaxation; shrinkage; creep; elevated temperature	Loss of tendon prestress is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation.See the Standard Review Plan, Section 4.5, "Concrete Containment Tendon Prestress" for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii). See Chapter X.S1 of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii).For periodic monitoring of prestress, see Chapter XI.S2.	Yes,TLAA
II	C-12	A3.1-a B4.1-a	Penetration sleeves	Steel; Dissimilar metal welds	Air – indoor uncontrolledor air outdoor	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE,"(Note: IWE examination category E-F, surface examination of dissimilar metal welds, is recommended)Chapter XI.S4, "10 CFR Part 50, Appendix J," andIf a coatings program is credited for managing loss of material due to corrosion during the current licensing term (e.g., relief request from IWE), then it is to be continued during the period of extended operation. See Chapter XI.S8, "Protective Coating Monitoring and Maintenance Program"	NoNoNo
II	C-12	A3.1-a B4.1-a	Penetration sleeves	Steel; dissimilar metal welds	Air – indoor uncontrolledor air outdoor	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE,"(Note: IWE examination category E-F, surface examination of dissimilar metal welds, is recommended)Chapter XI.S4, "10 CFR Part 50, Appendix J"	NoNo

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-15	A3.1-d B4.1-d	Penetration sleeves;Penetration bellows	Stainless steel; dissimilar metal welds	Air – indoor uncontrolled or air – outdoor	Cracking/ stress corrosion cracking	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”Evaluation of 10 CFR 50.55a/ASME Section XI, Subsection IWE is augmented as follows:(4) Detection of Aging Effects:Transgranular Stress corrosion cracking (TGSCC) is a concern for dissimilar metal welds. In the case of bellows assemblies, SCC may cause aging effects particularly if the material is not shielded from a corrosive environment. ASME Section XI, Subsection IWE covers inspection of these items under examination categories E-B, E-F, and E-P (10 CFR Part 50, Appendix J pressure tests). 10 CFR 50.55a identifies examination categories E-B and E-F as optional during the current term of operation. For the extended period of operation, Examination Categories E-B & E-F, and additional appropriate examinations to detect SCC in bellows assemblies and dissimilar metal welds are warranted to address this issue.(10) Operating Experience:IN 92-20 describes an instance of containment bell	Yes, detection of aging effects is to be evaluated
II	C-16	A3.2-a B4.2-a	Personnel airlock; equipment hatch, CRD hatch	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE,”Chapter XI.S4, “10 CFR Part 50, Appendix J,” andIf a coatings program is credited for managing loss of material due to corrosion during the current licensing term (e.g., relief request from IWE), then it is to be continued during the period of extended operation. See Chapter XI.S8, “Protective Coating Monitoring and Maintenance Program.”	NoNoNo
II	C-16	A3.2-a B4.2-a	Personnel airlock, equipment hatch, CRD hatch	Steel	Air – indoor uncontrolled or air – outdoor	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE,”Chapter XI.S4, “10 CFR Part 50, Appendix J”	NoNo

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-17	A3.2-b B4.2-b	Personnel airlock; equipment hatch: CRD hatchLocks, hinges, and closure mechanisms	Steel	Air – indoor uncontrolledor air outdoor	Loss of leak tightness/ mechanical wear of locks, hinges and closure mechanisms	Chapter XI.S4, “10 CFR Part 50, Appendix J” andPlant Technical Specifications	No
II	C-17	A3.2-b B4.2-b	Personnel airlock, equipment hatch, CRD hatch:Locks, hinges, and closure mechanisms	Steel	Air – indoor uncontrolledor air outdoor	Loss of leak tightness/ mechanical wear of locks, hinges and closure mechanisms	Chapter XI.S4, “10 CFR Part 50, Appendix J” andPlant Technical Specifications	No
II	C-18	A3.3-a B4.3-a	Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Elastomers, rubber and other similar materials	Air – indoor uncontrolledor air outdoor	Loss of sealing; Leakage through containment/ deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other	Chapter XI.S1, “ASME Section XI, Subsection IWE”Leak tightness will be monitored by 10 CFR Part 50, Appendix J Leak Rate Tests for pressure boundary, seals and gaskets (including O-rings).	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						sealants)		
II	C-18	A3.3-a B4.3-a	Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Elastomers, rubber and other similar materials	Air – indoor uncontrolled or air – outdoor	Loss of sealing; Leakage through containment/ deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Chapter XI.S1, “ASME Section XI, Subsection IWE”Leak tightness will be monitored by 10 CFR Part 50, Appendix J Leak Rate Tests for pressure boundary, seals and gaskets (including O-rings).	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-19	B1.1.1-a B2.1.1-a B2.2.2-a B3.1.1-a	Steel elements: Drywell; torus; drywellhead; embedded shelland sand pocket regions;drywell support skirt;torus ring girder;downcomers; ECCSsuction headerNOTE: Inspection of containment supports is addressed by ASME Section XI, Subsection IWF (see	Steel	Air – indoor uncontrolled	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE”For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied:Concrete meeting the specifications of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is necessary.Chapter XI.S4, “1	Yes, if corrosion is significant for inaccessible areas NoNo

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			III.B1.3)					

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-19	B1.1.1-a B3.1.1-a	Steel elements: Drywell; torus; drywellhead; embedded shelland sand pocket regions;drywell support skirt;torus ring girder;downcomers; ECCSsuction headerNOTE: Inspection of containment supports is addressed by ASME Section XI, Subsection IWF (see	Steel	Air – indoor uncontrolled or treated water (as applicable)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE"For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied:Concrete meeting the specifications of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is necessa	Yes, if corrosion is significant for inaccessible areas No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			III.B1.3)					
II	C-20	B1.1.1-b B2.2.2-c	Steel elements: Torus; vent line; vent header; vent line bellows; downcomers	Stainless steel; steel	Air – indoor uncontrolled	Cracking/ cyclic loading(CLB fatigue analysis does not exist)	Chapter XI.S1, “ASME Section XI, Subsection IWE ” and Chapter XI.S4, “10 CFR Part 50, Appendix J”Evaluation of 10 CFR 50.55a/IWE is augmented as follows:(4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-20	B1.1.1-b	Steel elements: Torus;Vent line;Vent header;Vent line bellows;Downcomers	Stainless steel; steel	Air – indoor uncontrolled	Cracking/ cyclic loading(CLB fatigue analysis does not exist)	Chapter XI.S1, "ASME Section XI, Subsection IWE " and Chapter XI.S4, "10 CFR Part 50, Appendix J"Evaluation of 10 CFR 50.55a/ ASME Section XI, Subsection IWE is augmented as follows:(4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated
II	C-21	B1.1.1-c B2.2.2-d	Steel elements: Torus; vent line; vent header; vent line bellows; downcomers	Stainless steel; steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis" for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
II	C-21	B1.1.1-c	Steel elements: Torus;Vent line;Vent header;Vent line bellows;Downcomers	Stainless steel; steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis" for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-22	B1.1.1-d B2.2.2-b	Steel elements: Vent line bellows	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, "ASME Section XI, Subsection IWE " and Chapter XI.S4, "10 CFR Part 50, Appendix J"Evaluation of 10 CFR 50.55a/IWE is augmented as follows:(4) Detection of Aging Effects: Stress corrosion cracking (SCC) is a concern for dissimilar metal welds. In the case of bellows assemblies, SCC may cause aging effects particularly if the material is not shielded from a corrosive environment. Subsection IWE covers inspection of these items under examination categories E-B, E-F, and E-P (10 CFR Part 50, Appendix J pressure tests). 10 CFR 50.55a identifies examination categories E-B and E-F as optional during the current term of operation. For the extended period of operation, Examination Categories E-B and E-F, and additional appropriate examinations to detect SCC in bellows assemblies and dissimilar metal welds are warranted to address this issue.(10) Operating Experience: IN 92-20 describes an instance of containment bellows cracking, resulting in loss of leak tightness.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-22	B1.1.1-d	Steel elements: Vent line bellows	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, “ASME Section XI, Subsection IWE “ and Chapter XI.S4, “10 CFR Part 50, Appendix J”Evaluation of 10 CFR 50.55a/ASME Section XI, Subsection IWE is augmented as follows:(4) Detection of Aging Effects: Stress corrosion cracking (SCC) is a concern for dissimilar metal welds. In the case of bellows assemblies, SCC may cause aging effects particularly if the material is not shielded from a corrosive environment. ASME Code 1995 edition, with addenda through 1996, ASME Section XI, Subsection IWE covers inspection of these items under Examination Categories E-B, E-F, and E-P (10 CFR Part 50, Appendix J pressure tests). 10 CFR 50.55a identifies examination categories E-B and E-F as optional during the current term of operation. For the extended period of operation, Examination Categories E-B and E-F, and additional appropriate examinations to detect SCC in bellows assemblies and dissimilar metal welds are warranted to address this issue.(10) Operating Experience: IN 92-20 describes	Yes, detection of aging effects is to be evaluated
II	C-23	B1.1.1-e B2.2.2-e B2.1.1-d	Steel elements: Drywell head; downcomers	Steel; Graphite plate	Air – indoor uncontrolled	Fretting or lockup/ mechanical wear	Chapter XI.S1, “ASME Section XI, Subsection IWE”	No
II	C-23	B1.1.1-e B2.2.2-e B2.1.1-d B1.2.	Steel elements: Drywell head;Downcomers	Steel	Air – indoor uncontrolled	Fretting or lockup/ mechanical wear	Chapter XI.S1, “ASME Section XI, Subsection IWE”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-24	B3.1.1-b B3.2.2-b	Steel elements: Suppression chamber shell (interior surface)	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	No
II	C-24	B3.1.1-b B3.2.2-b	Steel elements: Suppression chamber shell (interior surface)	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	No
II	C-25	Did not exist in Shuffle Master 1-28.						
II	C-25	A2.2-c B.3.1.2-b	Concrete: Basemat	Concrete	Ground water/soil	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, surface cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-26	Did not exist in Shuffle Master 1-28.						
II	C-26	B2.2.1-b	Concrete: Containment; wall; basemat	Concrete	Ground water/soil	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL".Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, surface cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive
II	C-27	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-27	B3.2.1-c	Concrete: Dome; wall; basemat	Concrete	Ground water/soil	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL".Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, surface cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive
II	C-28	Did not exist in Shuffle Master 1-28.						
II	C-28	A2.2-a	Concrete: Basemat	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S2, "ASME Section XI, Subsection IWL"Accessible areas:Inspections performed in accordance with IWL will indicate the presence of loss of material (spalling, scaling) and surface cracking due to freeze-thaw.Inaccessible Areas:Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557). Documented evidence confirms that where the existing concrete had air content of 3% to 6%, subsequent inspection did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation.The weathering index for the continental US is shown in ASTM C33-90, Fig. 1.	Yes, for plants located in moderate to severe weathering conditions
II	C-29	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-29	B3.2.1-a	Concrete: Dome; wall; basemat	Concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S2, “ASME Section XI, Subsection IWL”Accessible areas:Inspections performed in accordance with IWL will indicate the presence of loss of material (spalling, scaling) and surface cracking due to freeze-thaw.Inaccessible Areas:Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557). Documented evidence confirms that where the existing concrete had air content of 3% to 6%, subsequent inspection did not exhibit degradation related to freeze-thaw. Such inspections should be considered a part of the evaluation.The weathering index for the continental US is shown in ASTM C33-90, Fig. 1.	Yes, for plants located in moderate to severe weathering conditions
II	C-30	Did not exist in Shuffle Master 1-28.						
II	C-30	A2.2-b B3.1.2-a	Concrete: Basemat	Concrete	Water – flowing	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL”Accessible areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.Inaccessible Areas: An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas
II	C-31	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-31	B2.2.1-a B1.2.	Concrete: Containment; wall; basemat	Concrete	Water – flowing	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL”Accessible areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.Inaccessible Areas:An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas
II	C-32	Did not exist in Shuffle Master 1-28.						
II	C-32	B3.2.1-b	Concrete: Dome; wall; basemat	Concrete	Water – flowing	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL”Accessible areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.Inaccessible Areas:An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas
II	C-33	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-33	B3.2.1-h	Concrete: Dome; wall; basemat	Concrete	Air – indoor uncontrolled or air – outdoor	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programThe implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made.Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	Yes, if temperature limits are exceeded
II	C-34	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-34	A2.2-h	Concrete: Basemat	Concrete	Air – indoor uncontrolled or air – outdoor	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programThe implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made.Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	Yes, if temperature limits are exceeded
II	C-35	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-35	B2.2.1-g B1.2.	Concrete: Containment; wall; basemat	Concrete	Air – indoor uncontrolled or air – outdoor	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programThe implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made.Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	Yes, if temperature limits are exceeded
II	C-36	Did not exist in Shuffle Master 1-28.						
II	C-36	A2.2-f B3.1.2-e	Concrete: Basemat	Concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, “Structures Monitoring Program”If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant’s structures monitoring program or a de-watering system is relied upon
II	C-37	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-37	A1.1-f	Concrete: Dome; wall; basemat; ring girders; buttresse s	Concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, “Structures Monitoring Program”If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant’s structures monitoring program or a de-watering system is relied upon
II	C-38	Did not exist in Shuffle Master 1-28.						
II	C-38	A2.2-d	Concrete: Basemat	Concrete	Any	Cracking due to expansion/ reaction with aggregates	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking due to reaction with aggregates.Inaccessible Areas:As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77.Therefore, if these conditions are satisfied, aging management is not necessary.	Yes, if concrete was not constructed as stated for inaccessible areas
II	C-39	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-39	B2.2.1-c B1.2.	Concrete: Containm ent; wall; basemat	Concrete	Any	Cracking due to expansion/ reaction with aggregates	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking due to reaction with aggregates.Inaccessible Areas:As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77. Therefore, if these conditions are satisfied, aging management is not necessary.	Yes, if concrete was not constructed as stated for inaccessible areas
II	C-40	Did not exist in Shuffle Master 1-28.						
II	C-40	B3.2.1-d	Concrete: Dome; wall; basemat	Concrete	Any	Cracking due to expansion/ reaction with aggregates	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking due to reaction with aggregates.Inaccessible Areas:As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77.Therefore, if these conditions are satisfied, aging management is not necessary.	Yes, if concrete was not constructed as stated for inaccessible areas
II	C-41	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-41	B2.2.1-d B1.2.	Concrete: Basemat; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air – outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive
II	C-42	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-42	B3.2.1-e	Concrete: Dome; wall; basemat; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air – outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive
II	C-43	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-43	A2.2-e B3.1.2-d	Concrete: Basemat; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air – outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive
II	C-44	Did not exist in Shuffle Master 1-28.						
II	C-44	B2.1.1-b	Suppression pool shell; unbraced downcomers	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled or air – outdoor	Cracking/ cyclic loading(CLB fatigue analysis does not exist)	Chapter XI.S1, “ASME Section XI, Subsection IWE ” and Chapter XI.S4, “10 CFR Part 50, Appendix J”Evaluation of 10 CFR 50.55a/ASME Section XI, Subsection IWE is to be supplemented to consider the following:(4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated
II	C-45	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II	C-45	B2.1.1-c	Suppression pool shell; unbraced downcomers	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled or air – outdoor	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, “Containment Liner Plate and Penetration Fatigue Analysis” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
II	C-46	Did not exist in Shuffle Master 1-28.						
II	C-46	B2.1.1-a B2.2.2-a B1.2.	Steel elements: Suppression chamber; drywell liner; drywell head; embedded shell; sand pocket region; support skirt; downcomer pipes; region shielded by diaphragm floorNOTE: Inspection of containment	Steel	Air – indoor uncontrolled or treated water (as applicable)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE”For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied:Concrete meeting the specifications of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is necessa	Yes, if corrosion is significant for inaccessible areasNo

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			supports is addressed by ASME Section XI, Subsection IWF (see III.B1.3)					
II	C-47	Did not exist in Shuffle Master 1-28.						
II	C-47	B2.2.2-c	Steel elements: Vent header;Downcomers	Stainless steel; steel	Air – indoor uncontrolled	Cracking/ cyclic loading(CLB fatigue analysis does not exist)	Chapter XI.S1, "ASME Section XI, Subsection IWE " and Chapter XI.S4, "10 CFR Part 50, Appendix J"Evaluation of 10 CFR 50.55a/ASME Section XI, Subsection IWE is augmented as follows:(4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated
II	C-48	Did not exist in Shuffle Master 1-28.						
II	C-48	B2.2.2-d	Steel elements: Vent header;Downcomers	Stainless steel; steel	Air – indoor uncontrolled or treated water (as applicabl	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis" for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					e)			
II	C-49	Did not exist in Shuffle Master 1-28.						
II	C-49	B2.2.2-b B1.2.	Steel elements: Suppression chamber liner (interior surface)	Stainless steel; steel	Air – indoor uncontrolled or treated water (as applicable)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE“ and Chapter XI.S4, “10 CFR Part 50, Appendix J"	No
II	C-50	Did not exist in Shuffle Master 1-28.						
II	C-50	B3.1.2-g	Concrete: Basemat, concrete fill-in annulus	Concrete	Air – indoor uncontrolled or air – outdoor	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programThe implementation of 10 CFR 50.55a and ASME Section XI, Subsection IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made.Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and	Yes, if temperature limits are exceeded

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
							this reduction is applied to the design allowables.	
II	C-51	Did not exist in Shuffle Master 1-28.						
II	C-51	B3.1.2-c	Concrete: Basemat, concrete fill-in annulus	Concrete	Any	Cracking due to expansion/ reaction with aggregates	Chapter XI.S2, “ASME Section XI, Subsection IWL”.Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of surface cracking due to reaction with aggregates.Inaccessible Areas:As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77.Therefore, if these conditions are satisfied, aging management	Yes, if concrete was not constructed as stated for inaccessible areas

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
							is not necessary.	
III	T-01	A1.1-a A2.1-a A3.1-a A5.1-a A7.1-a A8.1-a A9.1-a	Concrete: Exterior above and below grade; foundation	Reinforced concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S6, “StructuresMonitoring Program”Accessible Areas:Inspections performed in accordance with “Structures Monitoring Program” will indicate the presence of loss of material (spalling, scaling) and cracking due to freeze-thaw.Inaccessible Areas:Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index > 100 day-inch/yr) (NUREG-1557). Documented evidence to confirm that existing concrete has air content of 3% to 6% and subsequent inspections did not exhibit degradation related to freeze-thaw, should be considered a part of the evaluation.The weathering index for the continental US is shown in ASTM C33-90, Fig.1.	No, if within the scope of the applicant’s structures monitoring program and stated conditions are satisfied for inaccessible areas

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-01	A1.1-a A2.1-a A3.1-a A5.1-a A7.1-a A8.1-a A9.1-a	Concrete: Exterior above- and below-grade; foundation	Reinforced concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S6, “Structures Monitoring Program”Accessible Areas:Inspections performed in accordance with the Structures Monitoring Program will indicate the presence of loss of material (spalling, scaling) and cracking due to freeze-thaw.Inaccessible Areas:Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index > 100 day-inch/yr) (NUREG-1557). Documented evidence to confirm that existing concrete has air content of 3% to 6% and water-to-cement ratio of 0.35-0.45, and subsequent inspections did not exhibit degradation related to freeze-thaw, should be considered a part of the evaluation.The weathering index for the continental US is shown in ASTM C33-90, Fig.1.	Yes, if not within the scope of the applicant’s structures monitoring program or for plants located in moderate to severe weathering conditions
III	T-02	A1.1-b A2.1-b A3.1-b A5.1-b A7.1-b A8.1-b A9.1-b	Concrete: Exterior above and below grade; foundation	Reinforced concrete	Water – flowing	Increase in porosity and permeability, loss of strength/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL”Accessible areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.Inaccessible Areas:. An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	No,if concrete was constructed as stated for inaccessible areas

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-02	A1.1-b A2.1-b A3.1-b A5.1-b A7.1-b A8.1-b A9.1-b	Concrete: Exterior above- and below-grade; foundation	Reinforced concrete	Water – flowing	Increase in porosity and permeability, loss of strength/ leaching of calcium hydroxide	Chapter XI.S6, "Structures Monitoring Program"Accessible areas:Inspections performed in accordance with the Structures Monitoring Program will indicate the presence of increase in porosity, and permeability due to leaching of calcium hydroxide.Inaccessible Areas:An aging management program is not necessary, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas
III	T-03	A1.1-c A2.1-c A3.1-c A4.1-b A5.1-c A7.1-c A8.1-c A9.1-c	Concrete: All	Reinforced concrete	Any	Expansion and cracking/ reaction with aggregates	Chapter XI.S6, “Structures Monitoring Program”Accessible Areas:Inspections/evaluations performed in accordance with “Structures Monitoring Program” will indicate the presence of expansion and cracking due to reaction with aggregates.Inaccessible Areas:Evaluation is needed if testing and petrographic examinations of aggregates performed in accordance with ASTM C295-54, ASTM C227-50, or ACI 201.2R-77 (NUREG-1557) demonstrate that the aggregates are reactive.	No, if within the scope of the applicant’s structures monitoring program and stated conditions are satisfied for inaccessible areas

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-03	A1.1-c A2.1-c A3.1-c A4.1-b A5.1-c A7.1-c A8.1-c A9.1-c	Concrete: All	Reinforced concrete	Any	Cracking due to expansion/ reaction with aggregates	Chapter XI.S6, “Structures Monitoring Program”Accessible Areas:Inspections/evaluations performed in accordance with the Structures Monitoring Program will indicate the presence of expansion and cracking due to reaction with aggregates.Inaccessible Areas:As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77. Therefore, if these conditions are satisfied, aging management is not necessary.	Yes, if not within the scope of the applicant’s structures monitoring program or concrete was not constructed as stated for inaccessible areas.
III	T-04	A1.1-d A2.1-d A3.1-d A4.1-d A5.1-d A7.1-d A9.1-d	Concrete: Interior and above-grade exterior	Reinforced concrete	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, “Structures Monitoring Program”Accessible areas:Inspections performed in accordance with “Structures Monitoring Program” will indicate the presence of cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel.	No, if within the scope of the applicant’s structures monitoring program
III	T-04	A1.1-d A2.1-d A3.1-d A4.1-d A5.1-d A7.1-d A9.1-d	Concrete: Interior and above-grade exterior	Reinforced concrete	Air – indoor uncontrolled or air – outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, “Structures Monitoring Program”Accessible areas:Inspections performed in accordance with the Structures Monitoring Program will indicate the presence of cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel.	Yes, if not within the scope of the applicant’s structures monitoring program

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-05	A1.1-e A2.1-e A3.1-e A5.1-e A7.1-e A8.1-d A9.1-e	Concrete: Below-grade exterior; foundation	Reinforced concrete	Aggressive environment	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S2, "ASME Section XI, Subsection IWL".Accessible Areas:Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible Areas:Examination of representative samples of below-grade concrete, when excavated for any reason, is to be performed, if the below-grade environment is aggressive (pH < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is aggressive or non-aggressive.	Yes, if environment is aggressive
III	T-05	A1.1-e A2.1-e A3.1-e A5.1-e A7.1-e A8.1-d A9.1-e	Concrete: Below-grade exterior; foundation	Reinforced concrete	Ground water/soil	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, "Structures Monitoring Program"Accessible Areas:Inspections performed in accordance with the Structures Monitoring Program will indicate the cracking, loss of bond, or loss of material (spalling, scaling) due to corrosion of embedded steel.Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider(1) Examination of the exposed portions of the below-grade concrete, when excavated for any reason, and (2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations. For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-06	A1.1-f A2.1-f A3.1-f A4.1-a A5.1-f A7.1-f A9.1-f	Concrete: Interior and above-grade exterior	Reinforced concrete	Aggressive environment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S6, “Structures Monitoring Program”Accessible Areas:Inspections performed in accordance with “Structures Monitoring Program” will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.	No, if within the scope of the applicant’s structures monitoring program
III	T-06	A1.1-f A2.1-f A3.1-f A4.1-a A5.1-f A7.1-f A9.1-f	Concrete: Interior and above-grade exterior	Reinforced concrete	Air-indoor uncontrolled or air-outdoor	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S6, "Structures Monitoring Program"Accessible Areas:Inspections performed in accordance with Structures Monitoring Program will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.	Yes, if not within the scope of the applicant’s structures monitoring program
III	T-07	A1.1-g A2.1-g A3.1-g A5.1-g A7.1-g A8.1-e A9.1-g	Concrete: Below-grade exterior; foundation	Reinforced concrete	Aggressive environment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Inaccessible Areas:Examination of representative samples of below-grade concrete, when excavated for any reason, is to be performed, if the below-grade environment is aggressive (pH < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is aggressive or non-aggressive.	Yes, if environment is aggressive

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-07	A1.1-g A2.1-g A3.1-g A5.1-g A7.1-g A8.1-e A9.1-g	Concrete: Below-grade exterior; foundation	Reinforced concrete	Ground water/soil	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Inaccessible Areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider(1) Examination of the exposed portions of the below-grade concrete, when excavated for any reason, and (2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations. For plants with aggressive groundwater/soil, and/or where the concrete structural elements have experienced degradation, a plant specific AMP accounting for the extent of the degradation experienced should be implemented to manage the concrete aging during the period of extended operation.	Yes, plant-specific if environment is aggressive
III	T-08	A1.1-h A2.1-h A3.1-h A5.1-h A7.1-h A8.1-f A9.1-h A6.1-f	Concrete: All	Reinforced concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, “Structures Monitoring Program”The initial licensing basis for some plants included a program to monitor settlement. If no settlement was evident during the first decade or so, the NRC may have given the licensee approval to discontinue the program. However, if a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant’s structures monitoring program
III	T-08	A1.1-h A2.1-h A3.1-h A5.1-h A6.1-f A7.1-h A8.1-f A9.1-h	Concrete: All	Reinforced concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, “Structures Monitoring Program”If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant’s structures monitoring program or a de-watering system is relied upon

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-09	A1.1-l A2.1-l A3.1-l A5.1-l A6.1-g A7.1-l A8.1-g A9.1-i	Concrete: Foundation;subfoundation	Reinforced concrete; porous concrete	Water - flowing under foundation	Reduction in foundation strength, cracking, differential settlement/ erosion of porous concrete subfoundation	Chapter XI.S6, “Structures Monitoring Program”Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant’s structures monitoring program
III	T-09	A1.1-i A2.1-i A3.1-i A5.1-i A6.1-g A7.1-i A8.1-g A9.1-i	Concrete: Foundation; subfoundation	Reinforced concrete; Porous concrete	Water – flowing under foundation	Reduction in foundation strength, cracking, differential settlement/ erosion of porous concrete subfoundation	Chapter XI.S6, “Structures Monitoring Program”Erosion of cement from porous concrete subfoundations beneath containment basemats is described in NRC IN 97-11. NRC IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant’s structures monitoring program or a de-watering system is relied upon
III	T-10	A1.1-j A2.1-j A3.1-j A4.1-c A5.1-j	Concrete: All	Reinforced concrete	Air – indoor uncontrolled	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programFor any concrete elements that exceed specified temperature limits, further evaluations are warranted. Appendix A of ACI 349-85 specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas which are allowed to have increased temperatures not to exceed 200°F.	Yes, if applicable

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-10	A1.1-j A2.1-j A3.1-j A4.1-c A5.1-j	Concrete: All	Reinforced concrete	Air – indoor uncontrolled	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management programFor any concrete elements that exceed specified temperature limits, further evaluations are warranted. Appendix A of ACI 349-85 specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas which are allowed to have increased temperatures not to exceed 200°F.	Yes, if temperature limits are exceeded
III	T-11	A1.2-a A2.2-a A3.2-a A4.2-a A5.2-a A7.2-a A8.2-a	Steel components:All structural steel	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S6, “Structures Monitoring Program”If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include provisions to address protective coating monitoring and maintenance.	No, if within the scope of the applicant’s structures monitoring program
III	T-11	A1.2-a A2.2-a A3.2-a A4.2-a A5.2-a A7.2-a A8.2-a	Steel components:All structural steel	Steel	Air – indoor uncontrolled or air – outdoor	Loss of material/ corrosion	Chapter XI.S6, “Structures Monitoring Program”If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include provisions to address protective coating monitoring and maintenance.	Yes, if not within the scope of the applicant’s structures monitoring program
III	T-12	A1.3-a A2.3-a A3.3-a A5.3-a A6.3-a	Masonry walls:All	Concrete block	Air – indoor uncontrolled or air - outdoor	Cracking due to restraint shrinkage, creep, and aggressive environment	Chapter XI.S5, “Masonry Wall Program”	No
III	T-12	A1.3-a A2.3-a A3.3-a A5.3-a A6.3-a	Masonry walls:All	Concrete block	Air – indoor uncontrolled or air – outdoor	Cracking due to restraint shrinkage, creep, and aggressive environment	Chapter XI.S5, “Masonry Wall Program”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-13	A4.2-b	Steel components:Radial beam seats in BWR drywell;RPV support shoes for PWR with nozzle supports; Steam generator supports	Lubrite	Air – indoor uncontrolled	Lock-up/ wear	Chapter XI.S3, “ASME Section XI, Subsection IWF” orChapter XI.S6, “Structures Monitoring Program”	No, if within the scope of Section XI, IWF or structures monitoring program
III	T-13	A4.2-b	Steel components:Radial beam seats in BWR drywell;RPV support shoes for PWR with nozzle supports; Steam generator supports	Lubrite	Air – indoor uncontrolled	Lock-up/ wear	Chapter XI.S3, “ASME Section XI, Subsection IWF” orChapter XI.S6, “Structures Monitoring Program”	Yes, if not within the scope of Section XI, IWF or structures monitoring program

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-14	A5.2-b	Steel components:Fuel pool liner	Stainless steel	Water – standing	Cracking/ stress corrosion crackingLoss of material/pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry Program" and monitoring of the spent fuel pool water level	No
III	T-14	A5.2-b	Steel components:Fuel pool liner	Stainless steel	Treated water or treated borated water	Cracking/ stress corrosion crackingLoss of material/pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry" and,Monitoring of the spent fuel pool water level in accordance with technical specifications and leakage from the leak chase channels.	No
III	T-15	A6.1-a	Concrete: Exterior above and below grade; foundation; interior slab	Reinforced concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenanceAs described in NUREG-1557, freeze-thaw does not cause loss of material from reinforced concrete in foundations, and in above- and below-grade exterior concrete, for plants located in a geographic region of negligible weathering conditions (weathering index <100 day-inch/yr). Loss of material from such concrete is not significant at plants located in areas in which weathering conditions are severe (weathering index >500 day-inch/yr) or moderate (100-500 day-inch/yr), provided that the concrete mix design meets the air content (entrained air3-6%) and water-to-cement ratio(0.35-0.45) specified in ACI 318-63 or ACI 349-85. Therefore, if these conditions are satisfied, aging management is not necessary.The weathering index is defined in ASTM C33-90, Table 3, Footnote E. Fig. 1 of	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
							ASTM C33-90 illustrates t	

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-15	A6.1-a	Concrete: Exterior above- and below-grade; foundation	Reinforced concrete	Air – outdoor	Loss of material (spalling, scaling) and cracking/ freeze-thaw	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.Accessible Areas:Inspections performed in accordance with Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs will indicate the presence of loss of material (spalling, scaling) and cracking due to freeze-thaw.Inaccessible Areas:As described in NUREG-1557, freeze-thaw does not cause loss of material from reinforced concrete in foundations, or in above- and below-grade exterior concrete, for plants located in a geographic region of negligible weathering conditions (weathering index <100 day-inch/yr). Loss of material from such concrete is not significant at plants located in areas in which weathering conditions are severe (weathering index >500 day-i	Yes, for plants located in moderate to severe weathering conditions

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-16	A6.1-b	Concrete: Exterior above and below grade; foundation; interior slab	Reinforced concrete	Water – flowing	Increase in porosity and permeability, loss of strength/ leaching of calcium hydroxide	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenanceAs described in NUREG-1557, leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled. Cracking is controlled through proper arrangement and distribution of reinforcing bars. All of the above characteristics are assured if the concrete was constructed with the guidance of ACI 201.2R-77. Therefore, if these conditions are satisfied, aging management is not necessary.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-16	A6.1-b	Concrete: Exterior above- and below-grade; foundation; interior slab	Reinforced concrete	Water – flowing	Increase in porosity and permeability, loss of strength/ leaching of calcium hydroxide	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance programs#*#Accessible Areas:Inspections performed in accordance with Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance programs will indicate the presence of increase in porosity and permeability, loss of strength/ leaching of calcium hydroxideInaccessible Areas:As described in NUREG-1557, leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled. Cracking is controlled through proper a	Yes, if concrete was not constructed as stated for inaccessible areas
III	T-17	A6.1-c	Concrete: All	Reinforced concrete	Any	Expansion and cracking/ reaction with aggregates	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenanceAs described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77.Therefore, if these conditions are satisfied, aging management is not necessary.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-17	A6.1-c	Concrete: All	Reinforced concrete	Any	Cracking due to expansion/ reaction with aggregates	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.Accessible Areas:Inspections/evaluations performed in accordance with “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs will indicate the presence of expansion and cracking due to reaction with aggregates.Inaccessible areas:As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with ACI 201.2R-77. Therefore, if these conditions are satisfied, aging	Yes, if concrete was not constructed as stated for inaccessible areas

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-18	A6.1-d	Concrete: All	Reinforced concrete	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance.As described in NUREG-1557, corrosion of exterior above-grade and interior embedded steel is not significant if the steel is not exposed to an aggressive environment (concrete pH <11.5 or chlorides >500 ppm). If such steel is exposed to an aggressive environment, corrosion is not significant if the concrete in which the steel is embedded has a low water-to-cement ratio (0.35-0.45), adequate air entrainment (3-6%), low permeability, and is designed in accordance withACI 318-63 or ACI 349-85. Therefore, if these conditions are satisfied, aging management is not necessary.	No
III	T-18	A6.1-d	Concrete: All	Reinforced concrete	Air – indoor uncontrolled or air – outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.Accessible areas:As described in NUREG-1557, corrosion of exterior above-grade and interior embedded steel is not significant if the steel is not exposed to an aggressive environment (concrete pH <11.5 or chlorides >500 ppm). If such steel is exposed to an aggressive environment, corrosion is not significant if the concrete in which the steel is embedded has a low water-to-cement ratio (0.35-0.45), adequate air entrainment (3-6%), low permeability, and is designed in accordance with ACI 318-63 or ACI 349-85. Therefore, if these conditions are satisfied, aging management is not necessary.Inaccessible areas:For plants with non-aggressive ground water/soil; i.e., pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a	Yes, plant-specific if environment is aggressive

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
							minimum, consider (1) Examination of the exposed portions of the below gra	
III	T-19	A6.1-e	Concrete: All	Reinforced concrete	Aggressive environment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance.As described in NUREG-1557, aggressive chemical attack on interior and above-grade exterior reinforced concrete is not significant if the concrete is not exposed to an aggressive environment (pH <5.5), or to chloride or sulfate solutions beyond defined limits (>500 ppm chloride, or >1500 ppm sulfate). Therefore, if these conditions are satisfied, aging management is not necessary.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-19	A6.1-e	Concrete: All	Reinforced concrete	Ground water/soil	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.Accessible Areas:Inspections performed in accordance with "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance programs will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack.Inaccessible areas:For plants with non-aggressive ground water/soil; i.e. pH > 5.5, chlorides < 500 ppm, or sulfates <1500 ppm, as a minimum, consider: (1) Examination of the exposed portions of the below grade concrete, when excavated for any reason, and(2) Periodic monitoring of below-grade water chemistry, including consideration of potential seasonal variations.For plants with aggr	Yes, plant-specific if environment is aggressive
III	T-20	A6.1-h	Concrete: Exterior above and below grade; foundation; interior slab	Reinforced concrete	Water – flowing	Loss of material/ abrasion; cavitation	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance.	No
III	T-20	A6.1-h	Concrete: Exterior above- and below-grade;	Reinforced concrete	Water – flowing	Loss of material/ abrasion; cavitation	Chapter XI.S7, "Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			foundation; interior slab					
III	T-21	A6.2-a	Metal components:All structural members	Steel; Copper alloys	Air – indoor uncontrolled or air - outdoor	Loss of material/ General (steel only), pitting and crevice corrosion	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenanceIf protective coatings are relied upon to manage the effects of aging, this AMP is to include provisions to address protective coating monitoring and maintenance.	No
III	T-21	A6.2-a	Metal components:All structural members	Steel; copper alloys	Air – indoor uncontrolled or air - outdoor; Water – flowing or water – standing	Loss of material/ general (steel only), pitting and crevice corrosion	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.If protective coatings are relied upon to manage the effects of aging, this AMP is to include provisions to address protective coating monitoring and maintenance.	No
III	T-22	A6.4-a	Earthen water-controlstructures:Dams, embankments,reservoirs, channels, canals and ponds	Various	Water – flowingWater – standing	Loss of material, loss of form/ erosion, settlement, sedimentation, frost action, waves, currents, surface runoff, seepage	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-22	A6.4-a	Earthen water-control structures:Dams,Embankments,Reservoirs,Channels, Canals and ponds	Various	Water – flowingWater – standing	Loss of material, loss of form/ erosion, settlement, sedimentation, frost action, waves, currents, surface runoff, seepage	Chapter XI.S7, “Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants” or the FERC / US Army Corp of Engineers dam inspections and maintenance programs.	No
III	T-23	A7.2-b A8.2-b	Steel components:Tank liner	Stainless steel	Water – standing	Cracking/ stress corrosion crackingLoss of material/pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes
III	T-23	A7.2-b A8.2-b	Steel components:Tank liner	Stainless steel	Water – standing	Cracking/ stress corrosion crackingLoss of material/pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
III	T-24	B1.1.1-a B1.2.1-a B1.3.1-a	Support members; welds; bolted connections; support anchorag	Steel	Air – indoor uncontrolledor air outdoor	Loss of material/ general and pitting corrosion	Chapter XI.S3, “ASME Section XI, Subsection IWF”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			e to building structure					
III	T-24	B1.1.1-a B1.2.1-a B1.3.1-a	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled or air – outdoor	Loss of material/ general and pitting corrosion	Chapter XI.S3, “ASME Section XI, Subsection IWF”	No
III	T-25	B1.1.1-b B1.2.1-b B2.1-b B3.1-b B4.1-b B5.1-b	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
III	T-25	B1.1.1-b B1.2.1-b B2.1-b B3.1-b B4.1-b B5.1-b	Support members; welds; bolted connections; support anchorag	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			e to building structure					
III	T-26	B1.1.1-c B1.2.1-c B1.3.1-b	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
III	T-26	B1.1.1-c B1.2.1-c B1.3.1-b	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue(Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
III	T-27	B1.1.2-a	High strength bolting for NSSS component supports	Low alloy steel, yield strength >150 ksi	Air – indoor uncontrolled (External)	Cracking/ stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-27	B1.1.2-a	High strength bolting for NSSS component supports	Low alloy steel, yield strength >150 ksi	Air – indoor uncontrolled (External)	Cracking/ stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No
III	T-28	B1.1.3-a B1.2.2-a B1.3.2-a	Constant and variable load spring hangers; guides; stops; sliding surfaces; design clearances; vibration isolators	Steel and non-steel materials (e.g., lubrite plates, vibration isolators, etc.)	Air – indoor uncontrolled or air - outdoor	Loss of mechanical function/ corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No
III	T-28	B1.1.3-a B1.2.2-a B1.3.2-a	Constant and variable load spring hangers; guides; stops; sliding surfaces; design clearances; vibration isolators	Steel and non-steel materials (e.g., lubrite plates, vibration isolators, etc.)	Air – indoor uncontrolled or air – outdoor	Loss of mechanical function/ corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening	Chapter XI.S3, "ASME Section XI, Subsection IWF"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-29	B1.1.4-a B1.2.3-a B1.3.3-a B2.2-a B3.2-a B4.3-a B5.2-a	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Reinforced concrete; grout	Air – indoor uncontrolled or air - outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	Chapter XI.S6, “Structures Monitoring Program”	No, if within the scope of the applicant’s structures monitoring program
III	T-29	B1.1.4-a B1.2.3-a B1.3.3-a B2.2-a B3.2-a B4.3-a B5.2-a	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Reinforced concrete; Grout	Air – indoor uncontrolled or air – outdoor	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	Chapter XI.S6, “Structures Monitoring Program”	Yes, if not within the scope of the applicant’s structures monitoring program
III	T-30	B2.1-a B3.1-a B4.1-a B5.1-a	Support members; welds; bolted connections; support anchorage to	Steel	Air – indoor uncontrolled (External)	Loss of material/ general and pitting corrosion	Chapter XI.S6, “Structures Monitoring Program”	No, if within the scope of the applicant’s structures monitoring program

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			building structure					
III	T-30	B2.1-a B3.1-a B4.1-a B5.1-a	Support members; welds; bolted connections; support anchorage to building structure	Steel	Air – indoor uncontrolled or air – outdoor	Loss of material/ general and pitting corrosion	Chapter XI.S6, “Structures Monitoring Program”	Yes, if not within the scope of the applicant’s structures monitoring program
III	T-31	B4.2-a	Vibration isolation elements	Non-metallic (e.g.,Rubber)	Air – indoor uncontrolled or air - outdoor	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	Chapter XI.S6, “Structures Monitoring Program”	No, if within the scope of the applicant’s structures monitoring program

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	T-31	B4.2-a	Vibration isolation elements	Non-metallic (e.g.,Rubber)	Air – indoor uncontrolled or air – outdoor	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	Chapter XI.S6, “Structures Monitoring Program”	Yes, if not within the scope of the applicant’s structures monitoring program
III	TP-1	B2. B4.	Steel components:Radial beam seats in BWR drywell; RPV support shoes for PWR with nozzle supports; other supports	Lubrite	Air – indoor uncontrolled	Loss of mechanical function/ corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening	Chapter XI.S6, “Structures Monitoring Program”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	TP-1	B2. B4.	Steel components:Radial beam seats in BWR drywell;RPV support shoes for PWR with nozzle supports; Other supports	Lubrite	Air – indoor uncontrolled	Loss of mechanical function/ corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening	Chapter XI.S6, “Structures Monitoring Program”	No
III	TP-10	Did not exist in Shuffle Master 1-28.						
III	TP-10	B1.1	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel; steel	Treated Water < 60C (<140 F)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water, andChapter XI.S3, “ASME Section XI, Subsection IWF”	No
III	TP-11	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	TP-11	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel	Air – indoor uncontrolled	None	None	No
III	TP-2	B2. B4.	Sliding support bearings and sliding support surfaces	Lubrite	Air – outdoor	Loss of mechanical function/ corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening	Chapter XI.S6, “Structures Monitoring Program”	No
III	TP-2	B2. B4.	Sliding support bearings and sliding support surfaces	Lubrite	Air – outdoor	Loss of mechanical function/ corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening	Chapter XI.S6, “Structures Monitoring Program”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	TP-3	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel, aluminum	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
III	TP-3	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel, aluminum	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
III	TP-4	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel	Air with borated water leakage	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	TP-4	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel	Air with borated water leakage	None	None	No
III	TP-5	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel	Air – indoor uncontrolled	None	None	No
III	TP-5	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Stainless steel	Air – indoor uncontrolled	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	TP-6	B2. B4.	Support members ; welds; bolted connectio ns; support anchorag e to building structure	Galvaniz ed steel, aluminum , stainless steel	Air – outdoor	Loss of material/ pitting and crevice corrosion	Chapter XI.S6, “Structures Monitoring Program”	No
III	TP-6	B2. B4.	Support members ; welds; bolted connectio ns; support anchorag e to building structure	Galvaniz ed steel, aluminum , stainless steel	Air – outdoor	Loss of material/ pitting and crevice corrosion	Chapter XI.S6, “Structures Monitoring Program”	No
III	TP-7	A6.5.	Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Elastome rssuch as EPDM rubber	Various	Loss of sealing/ deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Chapter XI.S6, “Structures Monitoring Program”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	TP-7	A6.	Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Elastomersuch as EPDM rubber	Various	Loss of sealing/ deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Chapter XI.S6, “Structures Monitoring Program”	No
III	TP-8	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Galvanized steel, aluminum	Air – indoor uncontrolled	Loss of material/ galvanic corrosion	Chapter XI.S6, “Structures Monitoring Program”	No
III	TP-8	B1.1. B1.2. B1.3. B2. B3. B4. B5.	Support members; welds; bolted connections; support anchorage to building structure	Aluminum	Air – indoor uncontrolled	None	None	No
III	TP-9	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
III	TP-9	B1.1	High strength bolting for NSSS component supports	Low alloy steel, yield strength >150 ksi	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M18, "Bolting Integrity"	No
IV	R-01	D1.1-j D2.1-h	Instrument penetrations and primary side nozzles and welds	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed
IV	R-01	D1.1-i D1.1-j D2.1-h	Instrument penetrations and primary side nozzles, safe ends, and welds	Nickel alloy; steel with nickel-alloy cladding	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components, andChapter XI.M2, "Water Chemistry," for PWR primary water andFor nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-02	C2.1-g C2.2-h	Class 1 piping, fittings and branch connections < NPS 4	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714Inspection in accordance with ASME Section XI does not require volumetric examination of pipes less than NPS 4. A plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period of operation.	Yes,parameters monitored/ inspected and detection of aging effects are to be evaluated
IV	R-02	C2.1-g C2.2-h	Class 1 piping, fittings and branch connections < NPS 4	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ stress corrosion cracking, thermal and mechanical loading	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components, andChapter XI.M2, “Water Chemistry,” for BWR water andXI.M35, "One-Time Inspection of ASME Code Class 1 Small-bore Piping"	No
IV	R-03	C1.1-i	Class 1 piping, fittings and branch connections < NPS 4	Stainless steel; steel	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)Inspection in accordance with ASME Section XI does not require volumetric examination of pipes less than NPS 4. A plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period of operation.	Yes,parameters monitored/ inspected and detection of aging effects are to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-03	C1.1-i	Class 1 piping, fittings and branch connections < NPS 4	Stainless steel; steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking (for stainless steel only), and thermal and mechanical loading	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components, andChapter XI.M2, “Water Chemistry,” for BWR water andXI.M35, "One-Time Inspection of ASME Code Class 1 Small-bore Piping"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-04	A1.1-b A1.2-a A1.2-b A1.3-a A1.3-d A1.4-b A1.5-b A1.6-a A2.1-b A2.2-c A2.3-c A2.4-a A2.5-d C1.1-b C1.1-d C1.1-e C1.1-h C1.2-a C1.3-d C2.1-a C2.1-b C2.2-a C2.2-b C2.2-c C2.3-a C2.4-a C2.5-a C2.5-d C2.5-e C2.5-f C2.5-q D1.1-h D2.1-c	Piping, piping components, and piping elements; flanges; heater sheaths and sleeves; penetrations; pressure housings; pump casing/cover; spray head; thermal sleeves; vessel shell heads and welds	Steel, stainless steel, cast austenitic stainless steel, carbon steel with nickel-alloy or stainless steel cladding, nickel-alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-04	A1.1-b A1.2-a A1.2-a A1.2-b A1.2-b A1.2-b A1.2-b A1.3-a A1.3-d A1.3-d A1.4-b A1.5-b A1.5-b A1.5-b A1.5-b A1.5-b A1.5-b A1.6-a	Reactor vessel components:Flanges;Nozzles;Penetrations;Safe ends;Thermal sleeves;Vessel shells, heads and welds	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-05	C2.1-e C2.2-g C2.5-i	Class 1 piping, piping components, and piping elements	Cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	Monitoring and control of primary water chemistry in accordance with the guidelines in EPRI TR-105714 (Rev. 3 or later revisions or update) minimize the potential of SCC, and material selection according to the NUREG-0313, Rev. 2 guidelines of ≤0.035% C and ≥7.5% ferrite reduces susceptibility to SCC.For CASS components that do not meet either one of the above guidelines, a plant-specific aging management program is to be evaluated. The program is to include (a) adequate inspection methods to ensure detection of cracks, and (b) flaw evaluation methodology for CASS components that are susceptible to thermal aging embrittlement.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-05	C2.1-e C2.2-g C2.5-i	Class 1 piping, piping components, and piping elements	Cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	Monitoring and control of primary water chemistry in accordance with the guidelines in EPRI TR-105714 (Rev. 3 or later) minimize the potential of SCC, and material selection according to NUREG-0313, Rev. 2 guidelines of ≤0.035% C and ≥7.5% ferrite reduces susceptibility to SCC.For CASS components that do not meet either one of the above guidelines, a plant-specific aging management program is to be evaluated. The program is to include (a) adequate inspection methods to ensure detection of cracks, and (b) flaw evaluation methodology for CASS components that are susceptible to thermal aging embrittlement.	Yes, plant-specific
IV	R-06	C2.5-k C2.5-s C2.5-m	Pressurizer instrumentation penetrations, heater sheaths and sleeves, heater bundle diaphram plate, and manways and flanges	Nickel alloy or nickel alloy cladding	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-06	C2.5-k C2.5-s C2.5-m	Pressurizer instrumentation penetrations, heater sheaths and sleeves, heater bundle diaphram plate, and manways and flanges	Nickel alloy or nickel alloy cladding	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" for Class 1 components, andChapter XI.M2, "Water Chemistry," for PWR primary water andFor nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed
IV	R-07	C2.2-f C2.5-h D1.1-i C2.5-m	Class 1 piping, fittings and primary nozzles, safe ends, manways, and flanges	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components andChapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
IV	R-07	C2.2-f C2.5-h D1.1-i C2.5-m	Class 1 piping, fittings, primary nozzles, safe ends, manways	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components andChapter XI.M2, "Water Chemistry," for PWR primary water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			, and flanges					
IV	R-08	C1.2-c C1.3-b C2.3-c C2.4-c	Class 1 pump casings, and valve bodies and bonnets	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 componentsFor pump casings and valve bodies, screening for susceptibility to thermal aging is not necessary. The ASME Section XI inspection requirements are sufficient for managing the effects of loss of fracture toughness due to thermal aging embrittlement of CASS pump casings and valve bodies.Alternatively, the requirements of ASME Code Case N-481 for pump casings are sufficient for managing the effects of loss of fracture toughness due to thermal aging embrittlement of CASS pump casings.	No
IV	R-08	C1.2-c C1.3-b C2.3-c C2.4-c	Class 1 pump casings, and valve bodies and bonnets	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 componentsFor pump casings and valve bodies, screening for susceptibility to thermal aging is not necessary. The ASME Section XI inspection requirements are sufficient for managing the effects of loss of fracture toughness due to thermal aging embrittlement of CASS pump casings and valve bodies. Alternatively, the requirements of ASME Code Case N-481 for pump casings are sufficient for managing the effects of loss of fracture toughness due to thermal aging embrittlement of CASS pump casings.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-09	C2.3-b C2.4-b	Class 1 pump casings and valve bodies	CASS, carbon steel with stainless steel cladding	Reactor coolant	Cracking/ stress corrosion cracking	Monitoring and control of primary water chemistry in accordance with the guidelines in EPRI TR-105714 (Rev. 3 or later revisions or update) minimize the potential of SCC, and material selection according to the NUREG-0313, Rev. 2 guidelines of ≤0.035% C and ≥7.5% ferrite reduces susceptibility to SCC.For CASS components that do not meet either one of the above guidelines, an aging management program should conform to Chapter XI.M1, “ASME Section XI, Subsections IWB, IWC, and IWD.”	No
IV	R-09	C2.3-b C2.4-b	Class 1 pump casings and valve bodies	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary water	No
IV	R-10	D1.1-l	Closure bolting	Steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No
IV	R-10	D1.1-l	Closure bolting	Steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-100	B1.4-a	Jet pump assembliesThermal sleeveInlet headerRiser brace armHolddown beamsInlet elbowMixing assembly DiffuserCastings	Nickel alloy, cast austenitic stainless steel, stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for jet pump assembly andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRITR-103515)	No
IV	R-100	B1.4-a	Jet pump assembliesThermal sleeveInlet headerRiser brace armHolddown beamsInlet elbowMixing assembly DiffuserCastings	Nickel alloy; stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for jet pump assembly andChapter XI.M2, “Water Chemistry,” for BWR water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-101	B1.4-c	Jet pump assembliesCastings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-101	B1.4-c	Jet pump assembliesCastings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-102	B1.4-d	Jet pump assembliesJet pump sensing line	Stainless steel	Reactor coolant	Cracking/ cyclic loading	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
IV	R-102	B1.4-d	Jet pump assembliesJet pump sensing line	Stainless steel	Reactor coolant	Cracking/ cyclic loading	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
IV	R-103	B1.5-a	Fuel supports and control rod drive assembliesOrificed fuel support	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-103	B1.5-a	Fuel supports and control rod drive assembliesOrificed fuel support	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-104	B1.5-c	Fuel supports and control rod drive assembliesControl rod drive housing	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M9, "BWR Vessel Internals," for lower plenum andChapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRITR-103515)	No
IV	R-104	B1.5-c	Fuel supports and control rod drive assembliesControl rod drive housing	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M9, "BWR Vessel Internals," for lower plenum andChapter XI.M2, "Water Chemistry," for BWR water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-105	B1.6-a	InstrumentationIntermediate range monitor (IRM) dry tubesSource range monitor (SRM) dry tubesIncore neutron flux monitor guide tubes	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, "BWR Vessel Internals," for lower plenum andChapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRITR-103515)	No
IV	R-105	B1.6-a	InstrumentationIntermediate range monitor (IRM) dry tubesSource range monitor (SRM) dry tubesIncore neutron flux monitor guide tubes	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, "BWR Vessel Internals," for lower plenum andChapter XI.M2, "Water Chemistry," for BWR water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-106	B2.1-a	Upper internals assembly Upper support plateUpper core plateHold-down spring	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-106	B2.1-a	Upper internals assembly Upper support plateUpper core plateHold-down spring	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-107	B2.1-b	Upper internals assembly Upper support plateUpper core plateHold-down spring	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-107	B2.1-b	Upper internals assembly Upper support plateUpper core plateHold-down spring	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-108	B2.1-d	Upper internals assembly Hold-down spring	Stainless steel	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-108	B2.1-d	Upper internals assembly Hold-down spring	Stainless steel	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-109	B2.1-e	Upper internals assembly Upper support column	Stainless steel, cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-109	B2.1-e	Upper internals assembly Upper support column	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-11	C2.3-e C2.4-e C2.5-n	Closure bolting	High-strength low-alloy steel, stainless steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-11	C2.3-e C2.4-e C2.5-n	Closure bolting	High-strength low-alloy steel, stainless steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No
IV	R-110	B2.1-f	Upper internals assembly Upper support column	Stainless steel, cast austenitic stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-110	B2.1-f	Upper internals assembly Upper support column	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-111	B2.1-g	Upper internals assembly Upper support column(only cast austenitic	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			stainless steel portions)					
IV	R-111	B2.1-g	Upper internals assembly Upper support column(only cast austenitic stainless steel portions)	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-112	B2.1-i	Upper internals assembly Upper support column bolts Upper core plate alignment pinsFuel alignment pins	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-112	B2.1-i	Upper internals assembly Upper support column bolts Upper core plate alignment pinsFuel alignment pins	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-113	B2.1-j	Upper internals assembly Upper support column bolts Upper core plate alignment pinsFuel alignment pins	Stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-113	B2.1-j	Upper internals assembly Upper support column bolts Upper core plate alignment pinsFuel alignment pins	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-114	B2.1-k	Upper internals assembly Upper support column bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-114	B2.1-k	Upper internals assembly Upper support column bolts	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-115	B2.1-l	Upper internals assembly Upper core plate alignment pins	Stainless steel, nickel alloy	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-115	B2.1-l	Upper internals assembly Upper core plate alignment pins	Stainless steel; nickel alloy	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-116	B2.2-a	RCCA guide tube assembli esRCCA guide tubes	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-116	B2.2-a	RCCA guide tube assembliesRCCA guide tubes	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-117	B2.2-b	RCCA guide tube assembliesRCCA guide tubes	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-117	B2.2-b	RCCA guide tube assembliesRCCA guide tubes	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-118	B2.2-d	RCCA guide tube assembliesRCCA guide tube boltsRCCA guide tube support pins	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-118	B2.2-d	RCCA guide tube assembliesRCCA guide tube boltsRCCA guide tube support pins	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-119	B2.2-e	RCCA guide tube assembliesRCCA guide tube boltsRCCA guide tube support	Stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			pins					
IV	R-119	B2.2-e	RCCA guide tube assembliesRCCA guide tube boltsRCCA guide tube support pins	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-12	C2.3-g C2.4-g C2.5-p	Closure bolting	High-strength low-alloy steel, stainless steel	Air with reactor coolant leakage	Loss of preload/ stress relaxation	Chapter XI.M18, “Bolting Integrity”	No
IV	R-12	C2.3-g C2.4-g C2.5-p	Closure bolting	Low-alloy steel, stainless steel	Air with reactor coolant leakage	Loss of preload/ thermal effects, gasket creep, and self-loosening	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-120	B2.3-a	Core barrelCore barrel (CB)CB flange (upper)CB outlet nozzlesThermal shield	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-120	B2.3-a	Core barrelCore barrel (CB)CB flange (upper)CB outlet nozzlesThermal shield	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-121	B2.3-b	Core barrelCore barrel (CB)CB flange (upper)CB outlet nozzlesThermal shield	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-121	B2.3-b	Core barrelCore barrel (CB)CB flange (upper)CB outlet nozzlesThermal shield	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-122	B2.3-c	Core barrelCore barrel (CB)CB flange (upper)CB outlet nozzlesThermal shield	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-122	B2.3-c	Core barrelCore barrel (CB)CB flange (upper)CB outlet nozzlesThermal shield	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-123	B2.4-a	Baffle/former assembly Baffle and former plates	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-123	B2.4-a	Baffle/former assembly Baffle and former plates	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-124	B2.4-b	Baffle/former assembly Baffle and former plates	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-124	B2.4-b	Baffle/former assembly Baffle and former plates	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-125	B2.4-c, B4.5-g	Core barrel assembly Baffle/former assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant and high fluence (>1 x 1021 n/cm2,E >0.1 MeV)	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-125	B2.4-c, B4.5-g	Core barrel assembly Baffle/former assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-126	B2.4-d	Baffle/former assembly Baffle/former bolts	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-126	B2.4-d	Baffle/former assembly Baffle/former bolts	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-127	B2.4-e	Baffle/former assembly Baffle and former plates	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-127	B2.4-e	Baffle/former assembly Baffle and former plates	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-128	B2.4-f	Baffle/former assembly Baffle/former bolts	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-128	B2.4-f B4.5-i	Baffle/former assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-129	B2.4-h	Baffle/former assembly Baffle/former bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-129	B2.4-h	Baffle/former assembly Baffle/former bolts	Stainless steel	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-13	C2.6-a	Pressurizer relief tankTank shell and headsFlanges and nozzlesSame as above	Steel with stainless steel cladding	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-13	C2.6-a	Pressurizer relief tankTank shell and headsFlanges and	Steel with stainless steel cladding	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nozzles					
IV	R-130	B2.5-a	Lower internal assembly Lower core plateRadial keys and clevis inserts	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-130	B2.5-a	Lower internal assembly Lower core plateRadial keys and clevis inserts	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-131	B2.5-b	Lower internal assembly Lower core plateRadial keys and clevis inserts	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-131	B2.5-b	Lower internal assembly Lower core plateRadial keys and clevis inserts	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-132	B2.5-c	Lower internal assembly Lower core plate	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-132	B2.5-c	Lower internal assembly Lower core plate	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-133	B2.5-e	Lower internal assembly Fuel alignment pinsLower support plate column boltsClevis insert bolts	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-133	B2.5-e	Lower internal assembly Fuel alignment pinsLower support plate column boltsClevis insert bolts	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-134	B2.5-f	Lower internal assembly Fuel alignment pinsLower support plate column boltsClevis insert bolts	Stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-134	B2.5-f	Lower internal assembly Fuel alignment pinsLower support plate column boltsClevis insert bolts	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-135	B2.5-g	Lower internal assembly Fuel alignment pinsLower support plate column boltsClevis insert bolts	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-135	B2.5-g	Lower internal assembly Fuel alignment pinsLower support plate column boltsClevis insert bolts	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-136	B2.5-h	Lower internal assembly Lower support plate column bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-136	B2.5-h	Lower internal assembly Lower support plate column bolts	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-137	B2.5-i	Lower internal assembly Clevis insert bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-137	B2.5-i	Lower internal assembly Clevis insert bolts	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-138	B2.5-k	Lower internal assembly Lower support forging or castingLower support plate columns	Stainless steel, cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-138	B2.5-k	Lower internal assembly Lower support forging or castingLower support plate columns	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-139	B2.5-l	Lower internal assembly Lower support forging or castingLower support plate columns	Stainless steel, cast austenitic stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-139	B2.5-l	Lower internal assembly Lower support forging or castingLower support plate columns	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-14	C2.6-c	Pressurizer relief tankTank shell and headsFlanges and nozzles	Stainless steel; steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 2 components andChapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
IV	R-14	C2.6-c	Pressurizer relief tankTank shell and headsFlanges and nozzles	Stainless steel; steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components andChapter XI.M2, "Water Chemistry," for PWR primary water	No
IV	R-140	B2.5-m	Lower internal assembly Lower support castingLower support plate columns	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-140	B2.5-m	Lower internal assembly Lower support castingLower support plate columns	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-141	B2.5-n	Lower internal assembly Lower support forgingLower support plate columns	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-141	B2.5-n	Lower internal assembly Lower support forgingLower support plate columns	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-142	B2.5-o	Lower internal assembly Radial keys and clevis Inserts	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-142	B2.5-o	Lower internal assembly Radial keys and clevis Inserts	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-143	B2.6-a	Instrumentation support structuresFlux thimble guide tubes	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-143	B2.6-a	Instrumentation support structuresFlux thimble guide tubes	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-144	B2.6-b	Instrumentation support structuresFlux thimble guide tubes	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-144	B2.6-b	Instrumentation support structuresFlux thimble guide tubes	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-145	B2.6-c	Instrumentation support structuresFlux thimble tubes	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and recommendations of NRC I&E Bulletin 88-09 “Thimble Tube Thinning in Westinghouse Reactors,” described below: In response to I&E Bulletin 88-09, an inspection program, with technical justification, is to be established and is to include (a) an appropriate thimble tube wear acceptance criterion, e.g., percent through-wall loss, and includes allowances for inspection methodology and wear scar geometry uncertainty, (b) an appropriate inspection frequency, e.g., every refueling outage, and (c) inspection methodology such as eddy current technique that is capable of adequately detecting wear of the thimble tubes. In addition, corrective actions include isolation or replacement if a thimble tube fails to meet the above acceptance criteria. Inspection schedule is in accordance with the guidelines of I&E Bulletin 88-09.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-145	B2.6-c	Instrumentation support structuresFlux thimble tubes	Stainless steel with or without chrome plating	Reactor coolant	Loss of material/ wear	Chapter XI.M37, “Flux Thimble Tube Inspection"	No
IV	R-146	B3.1-a	Upper Internals Assembly Upper guide structure support plateFuel alignment plateFuel alignment plate guide lugs and guide lug inserts	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-146	B3.1-a	Upper internals assembly Upper guide structure support plateFuel alignment plateFuel alignment plate guide lugs and	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			guide lug inserts					
IV	R-147	B3.1-b	Upper Internals Assembly Upper guide structure support plateFuel alignment plateFuel alignment plate guide lugs and guide lug inserts	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-147	B3.1-b	Upper internals assembly Upper guide structure support plateFuel alignment plateFuel alignment plate guide lugs and guide lug inserts	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-148	B3.1-c	Upper Internals Assembly Fuel alignment plateFuel alignment plate guide lugs and their lugsHold-down ring	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-148	B3.1-c	Upper internals assembly Fuel alignment plateFuel alignment plate guide lugs and their lugsHold-down ring	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-149	B3.2-a	CEA shroud assembli es	Stainless steel, cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-149	B3.2-a	CEA shroud assemblies	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-15	C1.4-a	Isolation condenser tube side components	Stainless steel; steel	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRITR-103515)The AMP in Chapter XI.M1 is to be augmented to detect cracking due to stress corrosion cracking and cyclic loading or loss of material due to pitting and crevice corrosion, and verification of the effectiveness of the program is necessary to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-15	C1.4-a	Isolation condenser components	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 componentsand Chapter XI.M2, "Water Chemistry," for BWR water. The AMP in Chapter XI.M1 is to be augmented to detect cracking due to stress corrosion cracking and verification of the program's effectiveness is necessary to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, detection of aging effects is to be evaluated
IV	R-150	B3.2-b	CEA shroud assembliesCEA shrouds bolts	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-150	B3.2-b	CEA shroud assembliesCEA shrouds bolts	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary water. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-151	B3.2-c	CEA shroud assembliesCEA shrouds bolts	Stainless steel, cast austenitic stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-151	B3.2-c	CEA shroud assembliesCEA shrouds bolts	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-152	B3.2-d	CEA shroud assembliesCEA shroud extension shaft guides	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components	No
IV	R-152	B3.2-d	CEA shroud assembliesCEA shroud extension shaft guides	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components	No
IV	R-153	B3.2-e	CEA shroud assemblies	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-153	B3.2-e	CEA shroud assemblies	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-154	B3.2-g	CEA shroud assembliesCEA shrouds bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-154	B3.2-g	CEA shroud assembliesCEA shrouds bolts	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-155	B3.3-a	Core support barrelCore support barrel upper flange	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-155	B3.3-a	Core support barrelCore support barrel upper flange	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-156	B3.3-b	Core support barrelCore support barrel upper flangeCore support barrel alignment keys	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-156	B3.3-b	Core support barrelCore support barrel upper flangeCore support barrel alignment keys	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-157	B3.3-a	Core support barrelCore support barrel upper flange	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-157	B3.3-a	Core support barrelCore support barrel upper flange	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-158	B3.3-b	Core support barrelCore support barrel upper flange	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-158	B3.3-b	Core support barrelCore support barrel upper flange	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-159	B3.4-a	Core shroud assembly Core shroud tie rods (core support plate attached by welds in later plants)	Stainless steel, cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-159	B3.4-a	Core shroud assembly Core shroud tie rods (core support plate attached by welds in later plants)	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-16	C1.4-b	Isolation condenser tube side components	Stainless steel; steel	Reactor coolant	Loss of material/ general (steel only), pitting and crevice corrosion	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRITR-103515)The AMP in Chapter XI.M1 is to be augmented to detect cracking due to stress corrosion cracking and cyclic loading or loss of material due to pitting and crevice corrosion, and verification of the effectiveness of the program is necessary to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, detection of aging effects is to be evaluated
IV	R-16	C1.4-b	Isolation condenser components	Stainless steel; steel	Reactor coolant	Loss of material/ general (steel only), pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
IV	R-160	B3.4-b	Core shroud assembly Core shroud tie rods (core support plate attached by welds in later plants)	Stainless steel, cast austenitic stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-160	B3.4-b	Core shroud assembly Core shroud tie rods (core support plate attached by welds in later plants)	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-161	B3.4-c	Core shroud assembly Core shroud tie rods (core support plate attached by welds in later plants)	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-161	B3.4-c	Core shroud assembly Core shroud tie rods (core support plate attached by welds	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			in later plants)					
IV	R-162	B3.4-e	Core shroud assembly Core shroud assembly bolts (later plants are welded)	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-162	B3.4-e	Core shroud assembly Core shroud assembly bolts (later plants are welded)	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-163	B3.4-f	Core shroud assembly Core shroud assembly bolts (later plants are welded)	Stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-163	B3.4-f	Core shroud assembly Core shroud assembly bolts (later plants are welded)	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-164	B3.4-g	Core shroud assembly Core shroud assembly bolts (later plants are welded)	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-164	B3.4-g	Core shroud assembly Core shroud assembly bolts (later plants are welded)	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-165	B3.4-h	Core shroud assembly Core shroud assembly boltsCore shroud tie rods	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-165	B3.4-h	Core shroud assembly Core shroud assembly boltsCore shroud tie rods	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-166	B3.5-a	Lower internal assembly Core support plateLower support structure beam assembliesCore support columnCore support barrel snubber assemblies	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-166	B3.5-a	Lower internal assembly Core support plateLower support structure beam assembliesCore support columnCore support barrel	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			snubber assemblies					
IV	R-167	B3.5-b	Lower internal Assembly Fuel alignment pinsCore support column bolts	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-167	B3.5-b	Lower internal Assembly Fuel alignment pinsCore support column bolts	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						cracking	the NRC for review and approval.	
IV	R-168	B3.5-c	Lower internal assembly Core support plateFuel alignment pinsLower support structure beam assembliesCore support column bolts Core support barrel snubber assemblies	Stainless steel, cast austenitic stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-168	B3.5-c	Lower internal assembly Core support plateFuel alignment pinsLower support structure beam assembliesCore support column bolts Core support barrel snubber assemblies	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-169	B3.5-d	Lower internal assembly Core support plateFuel alignment pinsLower support structure beam assembliesCore support column	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			bolts Core support barrel snubber assemblies					
IV	R-169	B3.5-d	Lower internal assembly Core support plateFuel alignment pinsLower support structure beam assembliesCore support column bolts Core support barrel snubber assemblies	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-17	A2.1-a A2.5-e A2.8-b C2.1-d C2.2-d C2.3-f C2.4-f C2.5-b C2.5-o C2.5-u C2.6-b D1.1-g D1.1-k D2.1-b D2.1-j	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
IV	R-17	A2.1-a A2.5-e A2.8-b C2.1-d C2.2-d C2.3-f C2.4-f C2.5-b C2.5-o C2.5-u C2.6-b D1.1-g D1.1-k D2.1-b D2.1-j	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-170	B3.5-e	Lower internal assembly Fuel alignment pinsCore support barrel snubber assemblies	Stainless steel, nickel alloy	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-170	B3.5-e	Lower internal assembly Fuel alignment pinsCore support barrel snubber assemblies	Stainless steel; nickel alloy	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-171	B3.5-f	Lower internal assembly Core support column	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No
IV	R-171	B3.5-f	Lower internal assembly Core support column	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-172	B4.1-a	Plenum cover and plenum cylinderPlenum cover assembly Plenum cylinderReinforcing plates	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-172	B4.1-a	Plenum cover and plenum cylinderPlenum cover assembly Plenum cylinderReinforcing plates	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-173	B4.1-b	Plenum cover and plenum cylinderTop flange-to-cover bolts Bottom flange-to-upper grid screws	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-173	B4.1-b	Plenum cover and plenum cylinderTop flange-to-cover bolts Bottom flange-to-upper grid screws	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-174	B4.1-c	Plenum cover and plenum cylinderPlenum cover assembly Plenum cylinderReinforcing platesTop flange-to-cover bolts Bottom flange-to-upper grid screws	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-174	B4.1-c	Plenum cover and plenum cylinderPlenum cover assembly Plenum cylinderReinforcing platesTop flange-to-cover bolts Bottom flange-to-	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			upper grid screws					
IV	R-175	B4.2-a	Upper grid assembly Upper grid rib sectionUpper grid ring forgingFuel assembly support padsPlenum rib pads	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-175	B4.2-a	Upper grid assembly Upper grid rib sectionUpper grid ring forgingFuel assembly support padsPlenum rib pads	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-176	B4.2-b	Upper grid assembly Rib- to-ring screws	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-176	B4.2-b	Upper grid assembly Rib- to-ring screws	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-177	B4.2-c	Upper grid assembly Upper grid rib sectionUpper grid ring forgingFuel assembly support padsPlenum rib padsRib-to-ring screws	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-177	B4.2-c	Upper grid assembly Upper grid rib sectionUpper grid ring forgingFuel assembly support padsPlenum rib padsRib-to-ring screws	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-178	B4.2-e	Upper grid assembly Upper grid rib sectionUpper grid ring forgingFuel assembly support padsPlenum rib padsRib-to-ring screws	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-178	B4.2-e	Upper grid assembly Upper grid rib sectionUpper grid ring forgingFuel assembly support padsPlenum rib padsRib-to-ring screws	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-179	B4.2-f	Upper grid assembly Fuel assembly support pads Plenum rib pads	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-179	B4.2-f	Upper grid assembly Fuel assembly support pads Plenum rib pads	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-18	C2.3-d C2.4-d C2.5-t C2.5-w	Piping and components external surfaces and bolting	Stainless steel; steel	System temperature up to 340°C (644°F)	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-18	C2.3-d C2.4-d C2.5-t C2.5-w	Piping and components external surfaces and bolting	Stainless steel; steel	System temperature up to 340°C (644°F)	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-180	B4.3-a	Control rod guide tube (CRGT) assembly CRGT pipe and flangeCRGT spacer castingCRGT rod guide tubesCRGT rod guide sectors	Stainless steel, cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-180	B4.3-a	Control rod guide tube (CRGT) assembly CRGT pipe and flangeCRGT spacer castingCRGT rod guide tubesCRGT rod guide sectors	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-181	B4.3-b	Control rod guide tube (CRGT) assembly CRGT spacer screwsFlange-to-upper grid screws	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-181	B4.3-b	Control rod guide tube (CRGT) assembly CRGT spacer screwsFlange-to-upper grid screws	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-182	B4.3-c	Control rod guide tube (CRGT) assembly CRGT pipe and flangeCRGT spacer castingCRGT spacer screwsFlange-to-upper grid screwsCRGT rod guide tubesCRGT rod guide sectors	Stainless steel, cast austenitic stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-182	B4.3-c	Control rod guide tube (CRGT) assembly CRGT pipe and flangeCRGT spacer castingCRGT spacer screwsFlange-to-upper grid screwsCRGT rod guide tubesCRGT rod guide sectors	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-183	B4.3-d	Control rod guide tube (CRGT) assembly CRGT spacer casting	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-183	B4.3-d	Control rod guide tube (CRGT) assembly CRGT spacer casting	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-184	B4.3-e	Control rod guide tube (CRGT) assembly Flange-to-upper grid screws	Stainless steel	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-184	B4.3-e	Control rod guide tube (CRGT) assembly Flange-to-upper grid screws	Stainless steel	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-185	B4.4-a	Core support shield assembly Core support shield cylinder (top and bottom flange)Outlet and vent valve (VV) nozzlesVV body and retaining ring	Stainless steel, PH stainless steel forging, CASS	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-185	B4.4-a	Core support shield assembly Core support shield cylinder (top and bottom flange)Outlet and vent valve (VV) nozzlesVV body	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			and retaining ring					
IV	R-186	B4.4-b	Core support shield assembly Core support shield-to-core barrel boltsVV assembly locking device	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-186	B4.4-b	Core support shield assembly Core support shield-to-core barrel boltsVV assembly locking	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			device			cracking	the NRC for review and approval.	
IV	R-187	B4.4-c	Core support shield assembly Core support shield cylinder (top and bottom flange)Core support shield-to-core barrel boltsVV retaining ringVV assembly locking device	Stainless steel, nickel alloy, PH Stainless Steel forging	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-187	B4.4-c	Core support shield assembly Core support shield cylinder (top and bottom flange)Core support shield-to-core barrel boltsVV retaining ringVV assembly locking device	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-188	B4.4-d	Core support shield assembly Core support shield cylinder (top and bottom flange)Core support shield-to-core	Stainless steel, nickel alloy, PH Stainless Steel forging	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			barrel boltsOutlet and vent valve (VV) nozzles VV assembly locking device					
IV	R-188	B4.4-d	Core support shield assembly Core support shield cylinder (top and bottom flange)Core support shield-to-core barrel boltsOutlet and vent valve (VV) nozzles VV	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			assembly locking device					
IV	R-189	B4.4-e	Reactor vessel internals components	Stainless steel, cast austenitic stainless steel, nickel alloy, PH Stainless Steel forging	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-189	Row was deleted since Shuffle Master 1-28.						
IV	R-19	C2.5-v	PressurizerIntegral support	Stainless steel; steel	Air with metal temperature up to 288°C (550°F)	Cracking/ cyclic loading	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-19	C2.5-v	PressurizerIntegral support	Stainless steel; steel	Air with metal temperature up to 288°C (550°F)	Cracking/ cyclic loading	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-190	B4.4-f	Core support shield assembly Core support shield cylinder(top flange)VV assembly locking device	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-190	B4.4-f	Core support shield assembly Core support shield cylinder(top flange)VV assembly locking device	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-191	B4.4-g	Core support shield assembly Outlet and vent valve nozzlesVV body and retaining ring	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-191	B4.4-g	Core support shield assembly Outlet and vent valve nozzlesVV body and retaining ring	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-192	B4.4-h	Core support shield assembly Core support shield-to-core barrel bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-192	B4.4-h	Core support shield assembly Core support shield-to-core barrel bolts	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-193	B4.5-a	Core barrel assembly Core barrel cylinder (top and bottom flange)Baffle plates and formers	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-193	B4.5-a	Core barrel assembly Core barrel cylinder (top and bottom flange)Baffle plates and formers	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-194	B4.5-b	Core barrel assembly Lower internals assembly -to-core barrel boltsCore barrel-to-thermal shield bolts	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-194	B4.5-b	Core barrel assembly Lower internals assembly -to-core barrel boltsCore barrel-to-thermal shield bolts	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-195	B4.5-c	Core barrel assembly Core barrel cylinder (top and bottom flange)Lower internals assembly -to- core barrel boltsCore barrel-to-thermal shield boltsBaffle plates and formers	Stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-195	B4.5-c	Core barrel assembly Core barrel cylinder (top and bottom flange)Lower internals assembly -to- core barrel boltsCore	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			barrel-to-thermal shield boltsBaffle plates and formers					
IV	R-196	B4.5-d	Core barrel assembly Core barrel cylinder (top and bottom flange)Lower internals assembly-to- core barrel boltsCore barrel-to-thermal shield boltsBaffle plates and formers	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-196	B4.5-d	Core barrel assembly Core barrel cylinder (top and bottom flange)Lower internals assembly -to- core barrel boltsCore barrel-to-thermal shield boltsBaffle plates and formers	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-197	B4.5-e	Core barrel assembly Lower internals assembly -to-core barrel boltsCore barrel-to-thermal shield bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-197	B4.5-e	Core barrel assembly Lower internals assembly -to-core barrel boltsCore barrel-to-thermal shield bolts	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-199	B4.5-h	Core barrel assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-199	B4.5-h	Core barrel assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-20	C1.1-f C1.2-b C1.3-c	Piping, piping components, and piping elements greater than or equal to 4 NPS	Stainless steel, cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No
IV	R-20	C1.1-f C1.2-b C1.3-c	Piping, piping components, and piping elements greater than or equal to 4 NPS	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water	No
IV	R-200	B4.5-i	Core barrel assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-200	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-201	B4.5-j	Core barrel assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-201	B4.5-j	Core barrel assembly Baffle/former bolts and screws	Stainless steel	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-202	B4.6-a	Lower grid assembly Lower grid rib sectionFuel assembly support padsLower grid flow dist. plateOrifice plugsLower grid and shell forgingsGuide blocksShock padsSupport post pipesIncore guide tube spider castings	Stainless steel, cast austenitic stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-202	B4.6-a	Lower grid assembly Lower grid rib sectionFuel assembly support padsLower grid flow dist. plateOrifice plugsLower grid and shell forgingsGuide blocksShock padsSupport post pipesIncore guide tube spider castings	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-203	B4.6-b	Lower grid assembly Lower grid rib-to-shell forging screwsLower internals assembly-to-thermal shield boltsGuide blocks and boltsShock pads and bolts	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-203	B4.6-b	Lower grid assembly Lower grid rib-to-shell forging screwsLower internals assembly-to-thermal shield boltsGuide blocks boltsSho	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			ck pads bolts					

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-204	B4.6-c	Lower grid assemblyLower grid rib sectionFuel assembly support padsLower grid rib-to-shell forging screwsLower grid flow dist. plateOrifice plugsLower grid and shell forgingsLower internals assembly-to-thermal shield boltsGuide blocks and boltsShock pads and boltsSupport post	Stainless steel, cast austenitic stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			pipesInco re guide tube spider castings					

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-204	B4.6-c	Lower grid assembly Lower grid rib sectionFuel assembly support padsLower grid rib-to-shell forging screwsLower grid flow dist. plateOrifice plugsLower grid and shell forgingsLower internals assembly-to-thermal shield boltsGuide blocks and boltsShock pads and boltsSupport post	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			pipesInco re guide tube spider castings					

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-205	B4.6-d	Lower grid assembly Lower grid rib sectionFuel assembly support padsLower grid rib-to-shell forging screwsLower grid flow dist. plateOrifice plugsLower grid and shell forgingsLower internals assembly-to-thermal shield boltsGuide blocks and boltsShock pads and boltsSupport post	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			pipes					

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-205	B4.6-d	Lower grid assembly Lower grid rib sectionFuel assembly support padsLower grid rib-to-shell forging screwsLower grid flow dist. plateOrifice plugsLower grid and shell forgingsLower internals assembly-to-thermal shield boltsGuide blocks and boltsShock pads and boltsSupport post	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			pipes					
IV	R-206	B4.6-e	Lower grid assembly Incore guide tube spider castings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-206	B4.6-e	Lower grid assembly Incore guide tube spider castings	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F) and neutron flux	Loss of fracture toughness/ thermal aging and neutron irradiation embrittlement	Chapter XI.M13, “Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No
IV	R-207	B4.6-g	Lower grid assembly Lower grid rib-to-shell forging screwsLower internals assembly -to-thermal shield bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-207	B4.6-g	Lower grid assembly Lower grid rib-to-shell forging screwsLower internals assembly -to-thermal shield	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			bolts					
IV	R-208	B4.6-h	Lower grid assembly Fuel assembly support pads Guide blocks	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-208	B4.6-h	Lower grid assembly Fuel assembly support pads Guide blocks	Stainless steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-209	B4.7-a	Flow distributor assembly Flow distributor head and flangeIncore guide support plateClamping ring	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-209	B4.7-a	Flow distributor assembly Flow distributor head and flangeIncore guide support plateClamping ring	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-21	C1.1-f	Piping, piping components, and piping elements greater than or equal to	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			4 NPS					
IV	R-21	C1.1-f	Piping, piping components, and piping elements greater than or equal to 4 NPS	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water	No
IV	R-210	B4.7-b	Flow distributor assembly Shell forging-to-flow distributor bolts	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-210	B4.7-b	Flow distributor assembly Shell forging-to-flow distributor bolts	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-211	B4.7-c	Flow distributor assembly Flow distributor head and flangeShell forging-to-flow distributor boltsIncore guide support plateClamping ring	Stainless steel, nickel alloy	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-211	B4.7-c	Flow distributor assembly Flow distributor head and flangeShell forging-to-flow distributor boltsIncore guide support plateClamping ring	Stainless steel; nickel alloy	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-212	B4.7-d	Flow distributor assembly Flow distributor head and flangeShell forging-to-flow distributor boltsIncore guide support	Stainless steel, nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			plateClamping ring					
IV	R-212	B4.7-d	Flow distributor assembly Flow distributor head and flangeShell forging-to-flow distributor boltsIncore guide support plateClamping ring	Stainless steel; nickel alloy	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-213	B4.7-e	Flow distributor assembly Shell forging-to-flow distributor bolts	Stainless steel, nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-213	B4.7-e	Flow distributor assembly Shell forging-to-flow distributor bolts	Stainless steel; nickel alloy	Reactor coolant	Loss of preload/ stress relaxation	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-214	B4.8-a	Thermal shield	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water chemistry" for PWR primary water, as described in EPRI TR-105714. No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-214	B4.8-a	Thermal shield	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M2, "Water Chemistry" for PWR primary waterNo further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-215	B4.8-b	Thermal shield	Stainless steel	Reactor coolant	Changes in dimensions/Void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-215	B4.8-b	Thermal shield	Stainless steel	Reactor coolant	Changes in dimensions/ void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-216	B4.8-c	Thermal shield	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment to be confirmed
IV	R-216	B4.8-c	Thermal shield	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval.	No, but licensee commitment needs to be confirmed
IV	R-217	C2.5-r	Pressurizer heater sheaths and sleeves, and heater bundle diaphragm plate	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-217	C2.5-r	Pressurizer heater sheaths and sleeves, and heater bundle diaphragm plate	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary water	No
IV	R-218	D1.1-i	Pressure boundary and structural Primary nozzles, safe ends, and welds	Nickel alloy or nickel alloy cladding	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed
IV	R-218	Row was deleted since Shuffle Master 1-28.						
IV	R-219	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-219	A2.1-b A2.2-c A2.2-c A2.3-c A2.3-c A2.3-c A2.4-a A2.4-a A2.4-a A2.4-a A2.5-d A2.5-d A2.5-d A2.5-d	Reactor vessel components:Flanges;Nozzles;Penetrations;Pressure housings; Safe ends;Thermal sleeves;Vessel shells, heads and welds	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-22	C1.1-f C1.3-c	Piping, piping components, and piping elements greater than or equal to 4 NPS	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No
IV	R-22	Row was deleted since Shuffle Master 1-28.						
IV	R-220	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-220	C1.1-b C1.1-d C1.1-e C1.1-e C1.1-h C1.1-h C1.1-h C1.1-h C1.1-h C1.1-h C1.1-h C1.2-a C1.2-a C1.2-a C1.3-d C1.3-d C1.3-d	Reactor coolant pressure boundary components:Piping, piping components, and piping elements	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-221	Did not exist in Shuffle Master 1-28.						
IV	R-221	D1.1-h	Recirculating steam generator components:Flanges; Penetrations; Nozzles; Safe ends, lower heads and welds	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-222	Did not exist in Shuffle Master 1-28.						
IV	R-222	D2.1-c	Once-through steam generator components:Primary side nozzlesSafe ends and welds	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-223	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-223	C2.1-a C2.1-a C2.1-b C2.1-b C2.2-a C2.2-a C2.2-a C2.2-a C2.2-b C2.2-b C2.2-c C2.3-a C2.3-a C2.4-a C2.4-a C2.5-a C2.5-d C2.5-d C2.5-e C2.5-f C2.5-f C2.5-f C2.5-q	Reactor coolant pressure boundary components:Piping, piping components, and piping elements; Flanges; Nozzles and safe ends;Pressurizer vessel shell heads and welds;Heater sheaths and sleeves;Penetrations; andThermal sleeves	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-224	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-224	D2.1-e	Steam generator componentsShell assembly	Steel	Secondary feedwater/ steam	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
IV	R-225	Did not exist in Shuffle Master 1-28.						
IV	R-225	C1.4-a	Isolation condenser components	Stainless steel; steel	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 componentsThe AMP in Chapter XI.M1 is to be augmented to detect cracking due to cyclic loading and verification of the program's effectiveness is necessary to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, detection of aging effects is to be evaluated
IV	R-226	Did not exist in Shuffle Master 1-28.						
IV	R-226	D2.	Tubes	Nickel alloy	Secondary feedwater/ steam	Denting/ corrosion of carbon steel tube support plate	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water.	No
IV	R-23	C1.1-a C1.1-c C1.3-a	Piping, piping components, and piping elements	Steel	Reactor coolant	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No
IV	R-23	C1.1-a C1.1-c C1.3-a	Piping, piping compone	Steel	Reactor coolant	Wall thinning/ flow-accelerated	Chapter XI.M17, “Flow-Accelerated Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nts, and piping elements			corrosion		
IV	R-24	C2.5-j	PressurizerSpray head	Nickel alloy, cast austenitic stainless steel, stainless steel	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” andChapter XI.M32 "One-Time Inspection" or Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," andprovide a commitment in the FSAR supplement to submit a plant-specific AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces.	No, unless licensee commitments need to be confirmed
IV	R-24	C2.5-j	PressurizerSpray head	Nickel alloy; stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” and Chapter XI.M32 "One-Time Inspection" andFor nickel alloy welded spray heads, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, unless licensee commitment needs to be confirmed
IV	R-25	C2.5-c C2.5-g	Pressurizer components	Steel with stainless steel or nickel alloy cladding; or stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-25	C2.5-c C2.5-g	Pressurizer components	Steel with stainless steel or nickel alloy cladding; or stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for Class 1 components, andChapter XI.M2, “Water Chemistry,” for PWR primary water	No
IV	R-26	C1.2-d C1.3-e	Pump and valve closure bolting	Steel	System temperature up to 288°C (550°F)	Loss of material/ wear	Chapter XI.M18, “Bolting Integrity”	No
IV	R-26	C1.2-d C1.3-e	Pump and valve closure bolting	Steel	System temperature up to 288°C (550°F)	Loss of material/ wear	Chapter XI.M18, “Bolting Integrity”	No
IV	R-27	C1.2-e C1.3-f	Pump and valve closure bolting	High-strength low-alloy steel SA 193 Gr. B7	System temperature up to 288°C (550°F)	Loss of preload/ stress relaxation	Chapter XI.M18, “Bolting Integrity”	No
IV	R-27	C1.2-e C1.3-f	Pump and valve closure bolting	Low-alloy steel SA 193 Gr. B7	System temperature up to 288°C (550°F)	Loss of preload/ thermal effects, gasket creep, and self-loosening	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-28	C1.2-f C1.3-g	Pump and valve closure bolting	Steel	System temperature up to 288°C (550°F)	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation; check Code limits for allowable cycles (less than 7000 cycles) of thermal stress range. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-28	C1.2-f C1.3-g	Pump and valve closure bolting	Steel	System temperature up to 288°C (550°F)	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation; check ASME Code limits for allowable cycles (less than 7000 cycles) of thermal stress range. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-29	C1.2-d C1.3-e	Pump and valve seal flange closure bolting	Stainless steel; steel	Air with metal temperature up to 288°C (550°F)	Loss of material/ wear	Chapter XI.M18, "Bolting Integrity"	No
IV	R-29	C1.2-d C1.3-e	Pump and valve seal flange closure bolting	Stainless steel; steel	System temperature up to 288°C (550°F)	Loss of material/ wear	Chapter XI.M18, "Bolting Integrity"	No
IV	R-30	C2.1-c	Reactor coolant system piping and fittingsCold legHot legSurge lineSpray line	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components andChapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-30	C2.1-c	Reactor coolant system piping and fittingsCold legHot legSurge lineSpray line	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary water	No
IV	R-31	D2.1-l	Secondary manways and handholes (cover only)	Steel	Air with leaking secondary-side water and/or steam	Loss of material/ erosion	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 2 components	No
IV	R-31	D2.1-l	Secondary manways and handholes (cover only)	Steel	Air with leaking secondary-side water and/or steam	Loss of material/ erosion	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 2 components	No
IV	R-32	D1.1-f D2.1-k	Steam generator closure bolting	Steel	System temperature up to 340°C (644°F)	Loss of preload/ stress relaxation	Chapter XI.M18, “Bolting Integrity”	No
IV	R-32	D1.1-f D2.1-k	Steam generator closure bolting	Steel	System temperature up to 340°C (644°F)	Loss of preload/ thermal effects, gasket creep, and self-loosening	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-33	D1.1-a D1.1-b D2.1-d D2.1-g	Steam generator components	Steel	Secondary feedwater/ steam	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-33	D1.1-a D1.1-b D2.1-d D2.1-g	Steam generator componentsTop head;Steam nozzle and safe end;Upper and lower shell;FW and AFW nozzle and safe end;FW impingement plate and support	Steel	Secondary feedwater/ steam	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-34	D1.1-c D2.1-e	Steam generator shell assembly (for OTSG), upper and lower shell, and transition cone (for	Steel	Secondary feedwater/ steam	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 2 components andChapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134As noted in NRC Information Notice IN 90-04, general and pitting corrosion of the shell exists, the AMP guidelines in Chapter XI.M1 may not be sufficient to detect general and pitting corrosion, and additional inspection procedures are to be developed.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			recirculating steam generator)					
IV	R-34	D1.1-c	Steam generator componentsUpper and lower shell, and transition cone	Steel	Secondary feedwater/ steam	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 2 components andChapter XI.M2, "Water Chemistry," for PWR secondary water. As noted in NRC IN 90-04, if general and pitting corrosion of the shell is known to exist, the AMP guidelines in Chapter XI.M1 may not be sufficient to detect general and pitting corrosion (and the resulting corrosion-fatigue cracking), and additional inspection procedures are to be developed. This issue is limited to Westinghouse Model 44 and 51 Steam Generators where a high stress region exists at the shell to transition cone weld.	Yes, detection of aging effects is to be evaluated
IV	R-35	D2.1-a	Steam generator componentsUpper and lower headsTube sheets	Steel with stainless steel or nickel-alloy cladding	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-35	D2.1-a	Primary side componentsUpper and lower headsTube sheets and tube-to-tube sheet welds	Steel with stainless steel or nickel alloy cladding	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components, andChapter XI.M2, “Water Chemistry,” for PWR primary water andFor nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed
IV	R-36	D2.1-i	Steam generator componentsSuch as, secondary side nozzles (vent, drain, and instrumentation)	Nickel alloy	Secondary feedwater/ steam	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” andChapter XI.M32 "One-Time Inspection" or Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD.”	No
IV	R-36	D2.1-i	Steam generator componentsSuch as secondary side nozzles (vent, drain, and instrumentation)	Nickel alloy	Secondary feedwater/ steam	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry" andChapter XI.M32 "One-Time Inspection" or Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD.”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-37	D1.1-d	Pressure boundary and structural Steam nozzle and safe endFW nozzle and safe end	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No
IV	R-37	D1.1-d	Pressure boundary and structural Steam nozzle and safe endFW nozzle and safe end	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No
IV	R-38	D2.1-f	Pressure boundary and structural FW and AFW nozzles and safe endsSteam nozzles and safe ends	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-38	D2.1-f	Steam generator componentsFW and AFW nozzles and safe endsSteam nozzles and safe ends	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No
IV	R-39	D1.1-e	Steam generator feedwater impingement plate and support	Steel	Secondary feedwater	Loss of material/ erosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
IV	R-39	D1.1-e	Steam generator feedwater impingement plate and support	Steel	Secondary feedwater	Loss of material/ erosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
IV	R-40	D1.2-i D1.2-j D2.2-f D2.2-g	Tube plugs	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-40	D1.2-i D1.2-j D2.2-f D2.2-g	Tube plugs	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR primary water	No
IV	R-41	D1.2-h	Tube support lattice bars	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	Applicant must provide a commitment in the FSAR supplement to submit, for NRC review and approval, an inspection plan for tube support lattice bars as based upon staff approved NEI 97-06 guidelines, or other alternative regulatory basis for steam generator degradation management, at least 24 months prior to the extended period.	No, but licensee commitment to be confirmed
IV	R-41	D1.2-h	Steam generator structural Tube support lattice bars	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water	No
IV	R-42	D1.2-k	Tube support plates	Steel	Secondary feedwater/ steam	Ligament cracking/ corrosion	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134	No
IV	R-42	D1.2-k D2.	Steam generator structural Tube support plates	Steel	Secondary feedwater/ steam	Ligament cracking/ corrosion	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-43	D1.2-g	Tubes	Nickel alloy	Secondary feedwater/ steam	Denting/ corrosion of carbon steel tube support plate	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134.For plants that could experience denting at the upper support plates, the applicant should evaluate potential for rapidly propagating cracks and then develop and take corrective actions consistent with Bulletin 88-02, “Rapidly Propagating Cracks in SG Tubes."	No
IV	R-43	D1.2-g	Tubes	Nickel alloy	Secondary feedwater/ steam	Denting/ corrosion of carbon steel tube support plate	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water.For plants that could experience denting at the upper support plates, the applicant should evaluate potential for rapidly propagating cracks and then develop and take corrective actions consistent with Bulletin 88-02, “Rapidly Propagating Cracks in SG Tubes."	No
IV	R-44	D1.2-a D2.2-a	Tubes and sleeves	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714.	No
IV	R-44	D1.2-a D2.2-a	Tubes and sleeves	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR primary water	No
IV	R-45	D1.2-d	Tubes and sleeves	Nickel alloy	Reactor coolant and secondary feedwater/steam	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of extended operation, and, for Class 1 components, environmental effects on fatigue are to be addressed. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-45	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-46	D2.2-e	Tubes and sleeves	Nickel alloy	Reactor coolant and secondary feedwater/steam	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-46	D1.2-d D2.2-e	Tubes and sleeves	Nickel alloy	Reactor coolant and secondary feedwater/steam	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-47	D1.2-b D2.2-b	Tubes and sleeves	Nickel alloy	Secondary feedwater/ steam	Cracking/ outer diameter stress corrosion cracking	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134	No
IV	R-47	D1.2-b D2.2-b	Tubes and sleeves	Nickel alloy	Secondary feedwater/ steam	Cracking/ outer diameter stress corrosion cracking	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water	No
IV	R-48	D1.2-c D2.2-c	Tubes and sleeves	Nickel alloy	Secondary feedwater/ steam	Cracking/ intergranular attack	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134	No
IV	R-48	D1.2-c D2.2-c	Tubes and sleeves	Nickel alloy	Secondary feedwater/ steam	Cracking/ intergranular attack	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-49	D1.2-e D2.2-d	Tubes and sleeves	Nickel alloy	Secondary feedwater/ steam	Loss of material/ fretting and wear	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134	No
IV	R-49	D1.2-e D2.2-d	Tubes and sleeves	Nickel alloy	Secondary feedwater/ steam	Loss of material/ fretting and wear	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water	No
IV	R-50	D1.2-f	Tubes and sleeves (exposed to phosphate chemistry)	Nickel alloy	Secondary feedwater/ steam	Loss of material/ wastage and pitting corrosion	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134	No
IV	R-50	D1.2-f	Tubes and sleeves (exposed to phosphate chemistry)	Nickel alloy	Secondary feedwater/ steam	Loss of material/ wastage and pitting corrosion	Chapter XI.M19, “Steam Generator Tubing Integrity” andChapter XI.M2, “Water Chemistry,” for PWR secondary water	No
IV	R-51	D1.3-a	Upper assembly and separatorsFeedwater inlet ring and support	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	A plant-specific aging management program is to be evaluated. As noted in Combustion Engineering (CE) Information Notice (IN) 90-04 and NRC IN 91-19 and LER 50-362/90-05-01, this form of degradation has been detected only in certain CE System 80 steam generators.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-51	D1.3-a	Upper assembly and separator sFeedwater inlet ring and support	Steel	Secondary feedwater/ steam	Wall thinning/ flow-accelerated corrosion	A plant-specific aging management program is to be evaluated. Reference NRC IN 91-19, "Steam Generator Feedwater Distribution Piping Damage."	Yes, plant-specific
IV	R-52	C1.1-g C2.1-f C2.2-e C2.5-l	Class 1 piping, piping components, and piping elements	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
IV	R-52	C1.1-g C2.1-f C2.2-e C2.5-l	Class 1 piping, piping components, and piping elements	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-53	B1.1-c B1.2-b B1.3-b B1.4-b B1.5-b B1.6-b B2.1-c B2.1-h B2.1-m B2.2-c B2.2-f B2.3-d B2.4-g B2.5-d B2.5-j B2.5-p	Reactor vessel internals components	Stainless steel, cast austenitic stainless steel, nickel alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-53	B1.1-c B1.2-b B1.3-b B1.4-b B1.5-b B1.6-b B2.1-c B2.1-h B2.1-m B2.2-c B2.2-f B2.3-d B2.4-g B2.5-d B2.5-j B2.5-p B3.2-f B3.4-d B3.5-g B4.1-d B4.2-d B4.3-f B4.4-e B4.5-f B4.6-f	Reactor vessel internals components	Stainless steel; nickel alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-54	B3.2-f B3.4-d B3.5-g B4.1-d B4.2-d B4.3-f B4.5-f B4.6-f	Reactor vessel internals components	Stainless steel, cast austenitic stainless steel, nickel alloy	Reactor coolant	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-54	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-55	C1.1-i	Class 1 piping, fittings and branch connections < NPS 4	Stainless steel; steel	Reactor coolant	Cracking/ thermal and mechanical loading	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 componentsInspection in accordance with ASME Section XI does not require volumetric examination of pipes less than NPS 4. A plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period of operation.The AMPs are to be augmented by verifying that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipe, fittings, and branch connections. See Chapter XI.M32, "One-Time Inspection" for an acceptable verification method.	Yes,parameters monitored/ inspected and detection of aging effects are to be evaluated
IV	R-55	Row was deleted since Shuffle Master 1-28.						
IV	R-56	C2.1-c	Reactor coolant system piping and fittingsCold legHot legSurge lineSpray line	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components	No
IV	R-56	C2.1-c	Reactor coolant system piping and fittingsCold legHot legSurge lineSpray	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			line					
IV	R-57	C2.1-g C2.2-h	Class 1 piping, fittings and branch connections < NPS 4	Stainless steel; steel with stainless steel cladding	Reactor coolant	Cracking/ thermal and mechanical loading	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 componentsInspection in accordance with ASME Section XI does not require volumetric examination of pipes less than NPS 4. A plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period of operation.The AMPs are to be augmented by verifying that service-induced weld cracking is not occurring in the small-bore piping less than NPS 4, including pipe, fittings, and branch connections. See Chapter XI.M32, "One-Time Inspection" for an acceptable verification method.	Yes,parameters monitored/ inspected and detection of aging effects are to be evaluated
IV	R-57	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-58	C2.5-c C2.5-g	Pressurizer components	Steel with stainless steel or nickel alloy cladding; or stainless steel	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714Cracks in the pressurizer cladding could propagate from cyclic loading into the ferrite base metal and weld metal. However, because the weld metal between the surge nozzle and the vessel lower head is subjected to the maximum stress cycles and the area is periodically inspected as part of the ISI program, the existing AMP is adequate for managing the effect of pressurizer clad cracking.	No
IV	R-58	C2.5-c C2.5-g	Pressurizer components	Steel with stainless steel or nickel alloy cladding; or stainless steel	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary waterCracks in the pressurizer cladding could propagate from cyclic loading into the ferrite base metal and weld metal. However, because the weld metal between the surge nozzle and the vessel lower head is subjected to the maximum stress cycles and the area is periodically inspected as part of the ISI program, the existing AMP is adequate for managing the effect of pressurizer clad cracking.	No
IV	R-59	A1.1-a	Top head enclosure (without cladding) Top headNozzles (vent, top head spray or RCIC, and	Steel	Reactor coolant	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			spare)					
IV	R-59	A1.1-a	Top head enclosure (without cladding) Top headNozzles (vent, top head spray or RCIC, and spare)	Steel	Reactor coolant	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
IV	R-60	A1.1-c	Top head enclosure Closure studs and nuts	High-strength low alloy steelMaximum tensile strength < 1172 MPa (<170 Ksi)	Air with reactor coolant leakage	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M3, “Reactor Head Closure Studs”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-60	A1.1-c	Top head enclosure Closure studs and nuts	High-strength low alloy steelMaximum tensile strength < 1172 MPa (<170 ksi)	Air with reactor coolant leakage	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M3, “Reactor Head Closure Studs”	No
IV	R-61	A1.1-d	Top head enclosure Vessel flange leak detection line	Stainless steel, nickel alloy	Air with reactor coolant leakage	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	A plant-specific aging management program is to be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC in the vessel flange leak detection line.	Yes, plant-specific
IV	R-61	A1.1-d	Top head enclosure Vessel flange leak detection line	Stainless steel; nickel alloy	Air with reactor coolant leakage (Internal) orReactor Coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	A plant-specific aging management program is to be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC in the vessel flange leak detection line.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-62	A1.2-c	Vessel shellIntermediate beltline shellBeltline welds	Steel (with or without stainless steel cladding)	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time dependent aging mechanism to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence exceeding 1017 n/cm2 (E >1 MeV) at the end of the license renewal term. Aspects of this evaluation may involve a TLAA. In accordance with approved BWRVIP-74, the TLAA is to evaluate the impact of neutron embrittlement on: (a) the adjusted reference temperature, the plant's pressure-temperature limits, (b) the need for inservice inspection of circumferential welds, and (c) the Charpy upper shelf energy or the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G. Additionally, the applicant is to monitor axial beltline weld embrittlement. One acceptable method is to determine that the mean RTNDT of the axial beltline welds at the end of the extended period of operation is less than the value specified by the staff in its May 7, 2000 letter. See the Standard Review Plan, Section 4.2 "Reactor Vessel Neutron	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-62	A1.2-c	Vessel shellInter mediate beltline shellBeltli ne welds	Steel (with or without stainless steel cladding)	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time dependent aging mechanism to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence greater than 1017 n/cm2 (E >1 MeV) at the end of the license renewal term. Aspects of this evaluation may involve a TLAA. In accordance with approved BWRVIP-74, the TLAA is to evaluate the impact of neutron embrittlement on: (a) the adjusted reference temperature values used for calculation of the plant's pressure-temperature limits, (b) the need for inservice inspection of circumferential welds, and (c) the Charpy upper shelf energy or the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G. Additionally, the applicant is to monitor axial beltline weld embrittlement. One acceptable method is to determine that the mean RTNDT of the axial beltline welds at the end of the extended period of operation is less than the value specified by the staff in its March 7, 2000 letter (ADAMS ML031430372). See the Sta	Yes,TLAA
IV	R-63	A1.2-d	Vessel shellInter mediate beltline shellBeltli ne welds	Steel (with or without stainless steel cladding)	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Chapter XI.M31, "Reactor Vessel Surveillance"	No
IV	R-63	A1.2-d	Vessel shellInter mediate beltline shellBeltli ne welds	Steel (with or without stainless steel cladding)	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Chapter XI.M31, "Reactor Vessel Surveillance"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-64	A1.2-e	Vessel shellAttachment welds	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M4, “BWR Vessel ID Attachment Welds,” andChapter XI.M2, “Water Chemistry,”for BWR water in BWRVIP-29 (EPRI TR-103515)	No
IV	R-64	A1.2-e	Vessel shellAttachment welds	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M4, “BWR Vessel ID Attachment Welds,” andChapter XI.M2, “Water Chemistry,” for BWR water	No
IV	R-65	A1.3-b	NozzlesFeedwater	Steel (with or without stainless steel cladding)	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M5, “BWR Feedwater Nozzle”	No
IV	R-65	A1.3-b	NozzlesFeedwater	Steel (with or without stainless steel cladding)	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M5, “BWR Feedwater Nozzle”	No
IV	R-66	A1.3-c	NozzlesControl rod drive return line	Steel (with or without stainless steel cladding)	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M6, “BWR Control Rod Drive Return Line Nozzle”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-66	A1.3-c	NozzlesControl rod drive return line	Steel (with or without stainless steel cladding)	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M6, “BWR Control Rod Drive Return Line Nozzle”	No
IV	R-67	A1.3-e	NozzlesLow pressure coolant injection or RHR injection mode	Steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence greater than 1017 n/cm2 (E >1 MeV) at the end of the license renewal term. In accordance with approved BWRVIP-74, the TLAA is to evaluate the impact of neutron embrittlement on: (a) the adjusted reference temperature, the plant’s pressure-temperature limits, (b) the Charpy upper shelf energy, and (c) the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G. The applicant may choose to demonstrate that the materials of the nozzles are not controlling for the TLAA evaluations. See the Standard Review Plan, Section 4.2 “Reactor Vessel Neutron Embrittlement” for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-67	A1.3-e	NozzlesLow pressure coolant injection or RHR injection mode	Steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence greater than 1E17 n/cm2 (E >1 MeV) at the end of the license renewal term. In accordance with approved BWRVIP-74, the TLAA is to evaluate the impact of neutron embrittlement on: (a) the adjusted reference temperature values used for calculation of the plant's pressure-temperature limits, and (b) the need for inservice inspection of circumferential welds, and (c) the Charpy upper shelf energy or the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G The applicant may choose to demonstrate that the materials of the nozzles are not controlling for the TLAA evaluations. See the Standard Review Plan, Section 4.2 "Reactor Vessel Neutron Embrittlement" for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes,TLAA
IV	R-68	A1.4-a	Nozzle safe ends (and associated welds)High pressure core sprayLow pressure core sprayControl rod drive return lineRecir	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking," andChapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			culating waterLow pressure coolant injection or RHR injection mode					
IV	R-68	A1.4-a	Nozzle safe ends (and associated welds)High pressure core sprayLow pressure core sprayControl rod drive return lineRecirculating waterLow pressure coolant injection or RHR	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			injection mode					
IV	R-69	A1.5-a	PenetrationsControl rod drive stub tubes InstrumentationJet pump instrumentStandby liquid controlFlux monitorDrain line	Stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, cyclic loading	Chapter XI.M8, “BWR Penetrations,” andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-69	A1.5-a	PenetrationsControl rod drive stub tubes InstrumentationJet pump instrumentStandby liquid controlFlux monitorDrain line	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, cyclic loading	Chapter XI.M8, “BWR Penetrations,” andChapter XI.M2, “Water Chemistry,” for BWR water	No
IV	R-70	A1.7-a	Support skirt and attachment welds	Steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-70	A1.7-a A2.8-a	Pressure vessel support skirt and attachment welds	Steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-71	A2.1-c	Closure headStud assembly	High-strength low alloy steelMaximum tensile strength < 1172 MPa (<170	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M3, “Reactor Head Closure Studs”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
				Ksi)				
IV	R-71	A2.1-c	Closure headStud assembly	High-strength low alloy steelMaximum tensile strength < 1172 MPa (<170 ksi)	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M3, "Reactor Head Closure Studs"	No
IV	R-72	A2.1-d	Closure headStud assembly	High-strength low alloy steelMaximum tensile strength < 1172 MPa (<170 Ksi)	Air with reactor coolant leakage	Loss of material/ wear	Chapter XI.M3, "Reactor Head Closure Studs"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-72	A2.1-d	Closure headStud assembly	High-strength low alloy steelMaximum tensile strength < 1172 MPa (<170 ksi)	Air with reactor coolant leakage	Loss of material/ wear	Chapter XI.M3, “Reactor Head Closure Studs”	No
IV	R-73	A2.1-e	Closure headStud assembly	High-strength low alloy steelMaximum tensile strength < 1172 MPa (<170 Ksi)	Air with reactor coolant leakage	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-73	A2.1-e	Closure headStud assembly	Low alloy steel	Air with reactor coolant leakage	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-74	A2.1-f	Closure headVessel flange leak detection line	Stainless steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC in the vessel flange leak detection line.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-74	A2.1-f	Closure headVessel flange leak detection line	Stainless steel	Air with reactor coolant leakage (Internal) orReactor Coolant	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC in the vessel flange leak detection line.	Yes, plant-specific
IV	R-75	A2.2-a	Control rod drive head penetrationNozzle and welds	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed
IV	R-75	A2.2-a	Control rod drive head penetrationNozzle and welds	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water and Chapter XI.M11-A, "Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (PWRs Only)"	No
IV	R-76	A2.2-b	Control rod drive head penetrationPressure housing	Stainless steel, cast austenitic stainless steel, nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-76	A2.2-b	Control rod drive head penetrationPressure housing	Stainless steel; nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” andChapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" and,For nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to submit a plant-specific AMP to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed
IV	R-77	A2.2-d	Control rod drive head penetrationPressure housing	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No
IV	R-77	A2.2-d	Control rod drive head penetrationPressure housing	Cast austenitic stainless steel	Reactor coolant >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No
IV	R-78	A2.2-e	Control rod drive head penetrationFlange bolting	Stainless steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No
IV	R-78	A2.2-e	Control rod drive head penetrationFlange bolting	Stainless steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-79	A2.2-f	Control rod drive head penetrationFlange bolting	Stainless steel	Air with reactor coolant leakage	Loss of material/ wear	Chapter XI.M18, "Bolting Integrity"	No
IV	R-79	A2.2-f	Control rod drive head penetrationFlange bolting	Stainless steel	Air with reactor coolant leakage	Loss of material/ wear	Chapter XI.M18, "Bolting Integrity"	No
IV	R-80	A2.2-g	Control rod drive head penetrationFlange bolting	Stainless steel	Air with reactor coolant leakage	Loss of preload/ stress relaxation	Chapter XI.M18, "Bolting Integrity"	No
IV	R-80	A2.2-g	Control rod drive head penetrationFlange bolting	Stainless steel	Air with reactor coolant leakage	Loss of preload/ thermal effects, gasket creep, and self-loosening	Chapter XI.M18, "Bolting Integrity"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-81	A2.3-a	NozzlesI nletOutlet Safety injection	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time-limited aging analysis (TLAA) to be evaluated for the period of license renewal for all ferritic materials that have a neutron fluence greater than 1017 n/cm2 (E >1 MeV) at the end of the license renewal term. The TLAA is to evaluate the impact of neutron embrittlement on: (a) the RTPTS value based on the requirements in10 CFR 50.61, (b) the adjusted reference temperature, the plant's pressure-temperature limits, (c) the Charpy upper shelf energy, and (d) the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G. The applicant may choose to demonstrate that the materials in the inlet, outlet, and safety injection nozzles are not controlling for the TLAA evaluations.	Yes,TLAA
IV	R-81	A2.3-a	NozzlesI nletOutlet Safety injection	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence greater than 1E17 n/cm2 (E >1 MeV) at the end of the license renewal term. The TLAA is to evaluate the impact of neutron embrittlement on: (a) the RTPTS value based on the requirements in 10 CFR 50.61, (b) the adjusted reference temperature values used for calculation of the plant's pressure-temperature limits, and (c) the Charpy upper shelf energy or the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G requirements. The applicant may choose to demonstrate that the materials in the inlet, outlet, and safety injection nozzles are not controlling for the TLAA evaluations.	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-82	A2.3-b	NozzlesInletOutlet Safety injection	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Chapter XI.M31, “Reactor Vessel Surveillance”	No
IV	R-82	A2.3-b	NozzlesInletOutlet Safety injection	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Chapter XI.M31, “Reactor Vessel Surveillance”	No
IV	R-83	A2.4-b	Nozzle safe ends and weldsInletOutletSafety injection	Stainless steel, cast austenitic stainless steel (nickel alloy welds and/or buttering)	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714.	No
IV	R-83	A2.4-b	Nozzle safe ends and welds:InletOutletSafety injection	Stainless steel; nickel alloy welds and/or buttering	Reactor coolant	Cracking/ stress corrosion cracking, primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for PWR primary water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-84	A2.5-a	Vessel shellUpper shellIntermediate and lower shell(including beltline welds)	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time-limited aging analysis (TLAA) to be evaluated for the period of license renewal for all ferritic materials that have a neutron fluence of greater than 1017 n/cm2 (E >1 MeV) at the end of the license renewal term. The TLAA is to evaluate the impact of neutron embrittlement on: (a) the RTPTS value based on the requirements in10 CFR 50.61, (b) the adjusted reference temperature, the plant's pressure temperature limits, (c) the Charpy upper shelf energy, and (d) the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G. See the Standard Review Plan, Section 4.2 "Reactor Vessel Neutron Embrittlement" for acceptable methods for meeting the requirements of10 CFR 54.21(c).	Yes,TLAA
IV	R-84	A2.5-a	Vessel shellUpper shellIntermediate and lower shell(including beltline welds)	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Neutron irradiation embrittlement is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for all ferritic materials that have a neutron fluence greater than 1E17 n/cm2 (E >1 MeV) at the end of the license renewal term. The TLAA is to evaluate the impact of neutron embrittlement on: (a) the RTPTS value based on the requirements in 10 CFR 50.61, (b) the adjusted reference temperature values used for calculation of the plant's pressure-temperature limits, and (c) the Charpy upper shelf energy or the equivalent margins analyses performed in accordance with 10 CFR Part 50, Appendix G requirements. See the Standard Review Plan, Section 4.2 "Reactor Vessel Neutron Embrittlement" for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-85	A2.5-b	Vessel shellUpper shellIntermediate and lower shell(including beltline welds)	SA508-Cl 2 forgings clad with stainless steel using a high-heat-input welding process	Reactor coolant	Crack growth/ cyclic loading	Growth of intergranular separations (underclad cracks) in low-alloy steel forging heat affected zone under austenitic stainless steel cladding is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for all the SA 508-Cl 2 forgings where the cladding was deposited with a high heat input welding process. The methodology for evaluating an underclad flaw is in accordance with the current well-established flaw evaluation procedure and criterion in the ASME Section XI Code. See the Standard Review Plan, Section 4.7, “Other Plant-Specific Time-Limited Aging Analysis,” for generic guidance for meeting the requirements of 10 CFR 54.21(c).	Yes,TLAA
IV	R-85	A2.5-b	Vessel shellUpper shellIntermediate and lower shell(including beltline welds)	SA508-Cl 2 forgings clad with stainless steel using a high-heat-input welding process	Reactor coolant	Crack growth/ cyclic loading	Growth of intergranular separations (underclad cracks) in low-alloy steel forging heat affected zone under austenitic stainless steel cladding is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for all the SA 508-Cl 2 forgings where the cladding was deposited with a high heat input welding process. The methodology for evaluating an underclad flaw is in accordance with the current well-established flaw evaluation procedure and criterion in the ASME Section XI Code. See the Standard Review Plan, Section 4.7, “Other Plant-Specific Time-Limited Aging Analysis,” for generic guidance for meeting the requirements of 10 CFR 54.21(c).	Yes,TLAA
IV	R-86	A2.5-c	Vessel shellUpper shellIntermediate and lower shell(including	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Chapter XI.M31, “Reactor Vessel Surveillance”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			beltline welds)					
IV	R-86	A2.5-c	Vessel shellUpper shellIntermediate and lower shell(including beltline welds)	Steel with stainless steel cladding	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement	Chapter XI.M31, “Reactor Vessel Surveillance”	No
IV	R-87	A2.5-f	Vessel shellVessel flange	Steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-87	A2.5-f	Vessel shellVessel flange	Steel	Reactor coolant	Loss of material/ wear	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components	No
IV	R-88	A2.6-a	Core support pads/core guide lugs	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” andChapter XI.M32 "One-Time Inspection" or Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," andprovide a commitment in the FSAR supplement to submit a plant-specific AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces.	No, unless licensee commitments need to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-88	A2.6-a	Core support pads/ core guide lugs	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M2, "Water Chemistry," andChapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" and,Comply with applicable NRC Orders and provide a commitment in the FSAR supplement to submit a plant-specific AMP to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed
IV	R-89	A2.7-a	PenetrationsInstrument tubes (bottom head)	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed
IV	R-89	A2.7-a	PenetrationsInstrument tubes (bottom head)	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" for Class 1 components, andChapter XI.M2, "Water Chemistry," for PWR primary water andComply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed
IV	R-90	A2.7-b	PenetrationsHead vent pipe (top head)Instrument tubes (top head)	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components and Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-90	A2.7-b	PenetrationsHead vent pipe (top head)Instrument tubes (top head)	Nickel alloy	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water and Chapter XI.M11-A, "Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (PWRs Only)"	No
IV	R-91	A2.8-a	Pressure vessel supportSkirt support	Steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
IV	R-91	Row was deleted since Shuffle Master 1-28.						
IV	R-92	B1.1-a	Core shroud (including repairs) and core plateCore shroud (upper, central, lower)	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for core shroud andChapter XI.M2, “Water Chemistry” for BWR water in BWRVIP-29 (EPRITR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-92	B1.1-a	Core shroud (including repairs) and core plateCore shroud (upper, central, lower)	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for core shroud andChapter XI.M2, “Water Chemistry” for BWR water	No
IV	R-93	B1.1-b	Core shroud and core plateCore plateCore plate bolts (used in early BWRs)	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for core plate andChapter XI.M2, “Water Chemistry” for BWR water in BWRVIP-29 (EPRITR-103515)	No
IV	R-93	B1.1-b	Core shroud and core plateCore plateCore plate bolts (used in early BWRs)	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress	Chapter XI.M9, “BWR Vessel Internals,” for core plate andChapter XI.M2, “Water Chemistry” for BWR water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						corrosion cracking		
IV	R-94	B1.1-d	Core shroud and core plateAccess hole cover(welded covers)	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)Because cracking initiated in crevice regions is not amenable to visual inspection, for BWRs with a crevice in the access hole covers, an augmented inspection is to include ultrasonic testing (UT) or other demonstrated acceptable inspection of the access hole cover welds.	No
IV	R-94	B1.1-d	Core shroud and core plateAccess hole cover(welded covers)	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for BWR waterBecause cracking initiated in crevice regions is not amenable to visual inspection, for BWRs with a crevice in the access hole covers, an augmented inspection is to include ultrasonic testing (UT) or other demonstrated acceptable inspection of the access hole cover welds.	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-95	B1.1-e	Core shroud and core plateAccess hole cover(mechanical covers)	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRITR-103515)	No
IV	R-95	B1.1-e	Core shroud and core plateAccess hole cover(mechanical covers)	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components andChapter XI.M2, “Water Chemistry,” for BWR water	No
IV	R-96	B1.1-f	Core shroud (including repairs) and core plateShroud support structure (shroud support	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress	Chapter XI.M9, “BWR Vessel Internals,” for shroud support andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRITR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			cylinder, shroud support plate, shroud support legs)			corrosion cracking		
IV	R-96	B1.1-f	Core shroud (including repairs) and core plateShroud support structure (shroud support cylinder, shroud support plate, shroud support legs)	Nickel alloy	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for shroud support andChapter XI.M2, “Water Chemistry,” for BWR water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	R-97	B1.1-g	Core shroud and core plate LPCI coupling	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for the LPCI coupling andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRITR-103515)	No
IV	R-97	B1.1-g	Core shroud and core plate LPCI coupling	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for the LPCI coupling andChapter XI.M2, “Water Chemistry,” for BWR water	No
IV	R-98	B1.2-a	Top guide	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress	Chapter XI.M9, “BWR Vessel Internals,” for top guide and Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						corrosion cracking		
IV	R-98	B1.2-a	Top guide	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for top guide and Chapter XI.M2, “Water Chemistry,” for BWR water. For top guides with neutron fluence exceeding the IASCC threshold (5E20, E>1 MeV) inspect ten (10) percent of the top guide locations using enhanced visual inspection technique, EVT-1 within 12 years, one-half of the inspections (5% of locations) to be completed within 6 years. Locations selected for examination will be areas that have exceeded the neutron fluence threshold in the areas of highest projected neutron fluence. The extent and frequency of examination of the top guide is similar to the examination of the control rod drive housing guide tube in BWRVIP-47.	No
IV	R-99	B1.3-a	Core spray lines and spargers Core spray lines (headers) Spray ringsSpra y	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress	Chapter XI.M9, “BWR Vessel Internals,” for core spray internals andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRITR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nozzlesThermal sleeves			corrosion cracking		
IV	R-99	B1.3-a	Core spray lines and spargers Core spray lines (headers) Spray ringsSpray nozzlesThermal sleeves	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking, irradiation-assisted stress corrosion cracking	Chapter XI.M9, “BWR Vessel Internals,” for core spray internals andChapter XI.M2, “Water Chemistry,” for BWR water	No
IV	RP-01	E.	Piping, piping components, and piping elements	Steel	Concrete	None	None	No
IV	RP-01	E.	Piping, piping components, and piping elements	Steel	Concrete	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-02	E.	Piping, piping components, and piping elements	Cast austenitic stainless steel	Air – indoor uncontrolled (External)	None	None	No
IV	RP-02	Row was deleted since Shuffle Master 1-28.						
IV	RP-03	E.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
IV	RP-03	E.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
IV	RP-04	E.	Piping, piping components, and piping elements	Stainless steel	Air – indoor uncontrolled (External)	None	None	No
IV	RP-04	E.	Piping, piping components, and piping elements	Stainless steel	Air – indoor uncontrolled (External)	None	None	No
IV	RP-05	E.	Piping, piping components, and piping	Stainless steel	Air with borated water leakage	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			elements					
IV	RP-05	E.	Piping, piping components, and piping elements	Stainless steel	Air with borated water leakage	None	None	No
IV	RP-06	E.	Piping, piping components, and piping elements	Stainless steel	Concrete	None	None	No
IV	RP-06	E.	Piping, piping components, and piping elements	Stainless steel	Concrete	None	None	No
IV	RP-07	E.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No
IV	RP-07	E.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-10	C2.	Piping, piping components, and piping elements	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, "Closed Cycle Cooling Water System"	No
IV	RP-10	C2.	Piping, piping components, and piping elements	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
IV	RP-11	C2.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
IV	RP-11	C2.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
IV	RP-12	C2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
IV	RP-12	C2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-13	A2.	Instrument penetrationBottom-mounted guide tube	Stainless steel	Air with reactor coolant leakage	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
IV	RP-13	A2.	Bottom-mounted guide tube	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
IV	RP-14	D1.	Steam generator anti-vibration bars	Chrome plated Nickel alloy, stainless steel, Nickel alloy	Secondary feedwater/ steam	Cracking/ stress corrosion cracking	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134	No
IV	RP-14	D1.	Steam generator structural Anti-vibration bars	Chrome plated steel; stainless steel; Nickel alloy	Secondary feedwater/ steam	Cracking/ stress corrosion cracking	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water	No
IV	RP-15	D1.	Steam generator anti-vibration bars	Chrome plated Nickel alloy, stainless steel, Nickel alloy	Secondary feedwater/ steam	Loss of material/ crevice corrosion and fretting	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-15	D1.	Steam generator structural Anti-vibration bars	Chrome plated steel; stainless steel; Nickel alloy	Secondary feedwater/ steam	Loss of material/ crevice corrosion and fretting	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water	No
IV	RP-16	D1.	Steam generator tube bundle wrapper	Steel	Secondary feedwater/ steam	Loss of material/ erosion, general, pitting, and crevice corrosion	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134	No
IV	RP-16	D1.	Steam generator Tube bundle wrapper	Steel	Secondary feedwater/ steam	Loss of material/ erosion, general, pitting, and crevice corrosion	Chapter XI.M19, "Steam Generator Tubing Integrity" andChapter XI.M2, "Water Chemistry," for PWR secondary water	No
IV	RP-17	D1.	Steam GeneratorDivider Plate	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," for Class 1 components andChapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
IV	RP-17	D1.	Primary sideDivider Plate	Stainless steel	Reactor coolant	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water	No
IV	RP-18	B1.	Steam Dryers	Stainless steel	Reactor coolant	Cracking/ flow-induced vibration	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
IV	RP-18	B1.	Steam Dryers	Stainless steel	Reactor coolant	Cracking/ flow-induced vibration	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-21	D1.	Steam GeneratorDivider Plate	Nickel alloy	Reactor coolant	Cracking/ Primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed
IV	RP-21	D1.	Primary sideDivider Plate	Nickel alloy; steel with nickel-alloy cladding	Reactor coolant	Cracking/ primary water stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR primary water	No
IV	RP-22	C2.	Pressurizer steam space nozzles and welds	Nickel alloy	Reactor coolant/ steam	Cracking/ Primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714 and, for Alloy 600, provide a commitment in the FSAR supplement to implement applicable (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitments to be confirmed
IV	RP-22	C2.	Pressurizer surge and steam space nozzles, and welds	Nickel alloy	Reactor coolant/ steam	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD” for Class 1 components, andChapter XI.M2, “Water Chemistry,” for PWR primary water andComply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed
IV	RP-23	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-23	C2.	Piping, piping components, and piping elements; flanges; heater sheaths and sleeves; penetrations; thermal sleeves; vessel shell heads and welds	Steel with stainless steel or nickel alloy cladding; stainless steel; nickel alloy	Reactor coolant	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR primary water	No
IV	RP-24	Did not exist in Shuffle Master 1-28.						
IV	RP-24	B2. B3. B4.	Reactor vessel internals components	Stainless steel; nickel alloy	Reactor coolant	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR primary water	No
IV	RP-25	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-25	A1.	Reactor Vessel:Flanges, nozzles; penetrations; safe ends; vessel shells, heads and welds	Stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor Coolant	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
IV	RP-26	Did not exist in Shuffle Master 1-28.						
IV	RP-26	B1.	Reactor vessel internals components	Stainless steel; nickel alloy	Reactor coolant	Loss of material/ pitting and crevice corrosion	Chapter XI.M1, “ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD,” for Class 1 components and Chapter XI.M2, “Water Chemistry” for BWR water	No
IV	RP-27	Did not exist in Shuffle Master 1-28.						
IV	RP-27	C1.	Reactor coolant pressure boundary components	Steel with stainless steel or nickel alloy cladding; stainless steel; nickel alloy	Reactor coolant	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
IV	RP-28	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV	RP-28	A2.	Flanges; nozzles; penetrations; pressure housings; safe ends; vessel shells, heads and welds	Stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy	Reactor Coolant	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR primary water	No
IV	RP-31	Did not exist in Shuffle Master 1-28.						
IV	RP-31	C2.	Piping, piping components, and piping elements	Nickel alloy	Reactor coolant/ steam	Cracking/ primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD" for Class 1 components, andChapter XI.M2, "Water Chemistry" for PWR primary water andComply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed
V	E-01	D1.8-c	Partially encased tanks with breached moisture barrier	Stainless steel	Untreated water or raw water	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated for pitting and crevice corrosion of tank bottom because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes, plant-specific
V	E-01	D1.8-c	Partially encased tanks with breached moisture	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated for pitting and crevice corrosion of tank bottom because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			barrier					
V	E-02	E.2-a	Closure bolting	Steel	Air with steam or water leakage	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
V	E-02	E.2-a	Closure bolting	Steel	Air with steam or water leakage	Loss of material/ general corrosion	Chapter XI.M18, "Bolting Integrity"	No
V	E-03	E.2-b	Closure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No
V	E-03	E.2-b	Closure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No
V	E-04	D2.5-b	Drywell and suppression chamber spray system (internal surfaces) :Flow	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general corrosion and fouling	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			orifice Spray nozzles					
V	E-04	D2.5-b	Drywell and suppression chamber spray system (internal surfaces) :Flow orifice Spray nozzles	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general corrosion and fouling	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-06	B.1-b B.2-b	Elastomer seals	Elastomers	Air – indoor uncontrolled	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-06	B.1-b B.2-b	Elastomer seals and components	Elastomers	Air – indoor uncontrolled	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-07	D2.1-f	Piping, piping components, and piping elements	Steel	Air and steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-07	D2.1-f	Piping, piping components, and piping elements	Steel	Steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No
V	E-08	D2.1-a D2.2-a D2.3-b	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	E-08	D2.1-a D2.2-a D2.3-b	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	E-09	D2.3-a	Piping, piping components, and piping elements	Steel	Treated water	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No
V	E-09	D2.3-a	Piping, piping components, and piping elements	Steel	Treated water	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No
V	E-10	D2.1-b	Piping, piping components, and piping elements	Steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-10	D2.1-b	Piping, piping compone nts, and piping elements	Steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
V	E-11	D2.1-d	Piping, piping compone nts, and piping elements	Cast austenitic stainless steel	Treated water >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No
V	E-11	D2.1-d	Piping, piping compone nts, and piping elements	Cast austenitic stainless steel	Treated water >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)”	No
V	E-12	A.1-a A.1-c A.3-a A.4-a D1.1-a D1.2-a D1.4-b D1.7-b D1.8-a	Piping, piping compone nts, piping elements, and tanks	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714	No
V	E-12	A.1-a A.1-c A.3-a A.4-a D1.1-a D1.2-a D1.4-b D1.7-b D1.8-a	Piping, piping compone nts, piping elements, and tanks	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR primary water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-13	D1.1-c D1.4-a	Piping, piping components, and piping elements	Stainless steel	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
V	E-13	D1.1-c D1.4-a	Piping, piping components, and piping elements	Stainless steel	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
V	E-14	D2.1-e	Piping, piping components, and piping elements internal surfaces	Stainless steel	Condensation (Internal)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-14	D2.1-e	Piping, piping components, and piping elements internal surfaces	Stainless steel	Condensation (Internal)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-16	D2.1-b	Piping, piping components, and piping elements	Stainless steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
V	E-16	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-17	A.6-c D1.5-a D1.6-a D2.4-c	Heat exchanger shell side components	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	E-17	A.6-c D1.5-a D1.6-a D2.4-c	Heat exchanger components	Steel	Closed cycle cooling water	Loss of material/ general, pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	E-18	A.6-a D1.6-b D2.4-a	Heat exchanger shell side components including tubes	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
V	E-18	A.6-a D1.6-b D2.4-a	Heat exchanger components	Steel	Raw water	Loss of material/ general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-19	A.6-c D1.5-a D1.6-a D2.4-c	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	E-19	A.6-c D1.5-a D1.6-a D2.4-c	Heat exchanger components	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	E-20	A.6-a D1.6-b D2.4-a	Heat exchanger shell side components including tubes	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
V	E-20	A.6-a D1.6-b D2.4-a	Heat exchanger components	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
V	E-21	A.6-b D1.6-c D2.4-b	Heat exchanger tubes (serviced by open-cycle	Stainless steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			cooling water)					
V	E-21	A.6-b D1.6-c D2.4-b	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
V	E-22	C.1-a	Containment isolation piping and components internal surfaces	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated. See IN 85-30 for evidence of microbiologically influenced corrosion.	Yes, plant-specific
V	E-22	C.1-a	Containment isolation piping and components internal surfaces	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
V	E-23	D2.4-b	Heat exchanger tubes (serviced by open-cycle cooling water)	Steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-23	D2.4-b	Heat exchanger tubes	Steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
V	E-24	D1.2-c	Orifice (miniflow recirculation)	Stainless steel	Treated borated water	Loss of material/ erosion	A plant-specific aging management program is to be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging. See LER 50-275/94-023 for evidence of erosion.	Yes, plant-specific
V	E-24	D1.2-c	Orifice (miniflow recirculation)	Stainless steel	Treated borated water	Loss of material/ erosion	A plant-specific aging management program is to be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging. See LER 50-275/94-023 for evidence of erosion.	Yes, plant-specific
V	E-25	B.2-a	Ducting, piping and components internal surfaces	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-25	B.2-a	Ducting and components internal surfaces	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
V	E-26	A.2-a A.5-a B.1-a B.2-a D2.1-e D2.5-a	Ducting, piping and components external surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-26	A.2-a A.5-a B.1-a B.2-a D2.1-e D2.5-a	Ducting, piping and components external surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
V	E-27	D2.1-e	Piping and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-27	D2.1-e	Piping and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
V	E-28	A.1-b A.3-b A.4-b A.5-b A.6-d D1.1-d D1.2-b D1.3-a D1.4-c D1.5-b D1.6-d D1.7-a D1.8-b E.1-a	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-28	A.1-b A.3-b A.4-b A.5-b A.6-d D1.1-d D1.2-b D1.3-a D1.4-c D1.5-b D1.6-d D1.7-a D1.8-b E.1-a	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
V	E-29	A.2-a A.5-a D2.5-a	Piping and components internal surfaces	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-29	A.2-a A.5-a D2.5-a	Piping and components internal surfaces	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
V	E-30	C.1-a	Containment isolation piping and components external surfaces	Steel	Condensation (External)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-30	C.1-a	Containment isolation piping and components external surfaces	Steel	Condensation (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
V	E-31	C.1-a	Containment isolation piping and components internal surfaces	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-31	C.1-a	Containment isolation piping and components internal surfaces	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry”The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	E-32	C.1-a	Containment isolation piping and components internal surfaces	Steel	Untreated water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated. See IN 85-30 for evidence of microbiologically influenced corrosion.	Yes, plant-specific
V	E-32	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-33	C.1-b	Containment isolation piping and components internal surfaces	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-33	C.1-b	Containment isolation piping and components internal surfaces	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	E-34	C.1-b	Containment isolation piping and components internal surfaces	Stainless steel	Untreated water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated. See IN 85-30 for evidence of microbiologically influenced corrosion.	Yes, plant-specific
V	E-34	C.1-b	Containment isolation piping and components internal surfaces	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-35	C.1-a	Containment isolation piping and components external surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-35	C.1-a	Containment isolation piping and components external surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
V	E-36	C.1-b	Containment isolation piping and components internal surfaces	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated. See IN 85-30 for evidence of microbiologically influenced corrosion.	Yes, plant-specific
V	E-36	Row was deleted since Shuffle Master 1-28.						
V	E-37	D2.1-c D2.3-c	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-37	D2.1-c D2.3-c	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking and intergranular stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water	No
V	E-38	D1.7-b	Safety injection tank (accumulator)	Steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714	No
V	E-38	D1.7-b	Safety injection tank (accumulator)	Steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR primary water	No
V	E-40	B.1-a	Ducting closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-40	B.1-a	Ducting closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
V	E-41	E.	Bolting	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
V	E-41	E.	Bolting	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-42	B.	Piping, piping components, and piping elements	Steel	Soil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M28, “Buried Piping and Tanks Surveillance,” orChapter XI.M34, “Buried Piping and Tanks Inspection”	No Yes, detection of aging effects and operating experience are to be further evaluated
V	E-42	B.	Piping, piping components, and piping elements	Steel (with or without coating or wrapping)	Soil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M28, “Buried Piping and Tanks Surveillance,” orChapter XI.M34, “Buried Piping and Tanks Inspection”	No Yes, detection of aging effects and operating experience are to be further evaluated
V	E-43	A. D1.	Motor Cooler	Gray cast iron	Treated water	Loss of material/ Selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
V	E-43	A. D1.	Motor Cooler	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
V	E-44	E.	External surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	E-44	E.	External surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
V	E-45	E.	External surfaces	Steel	Air – outdoor (External)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-45	E.	External surfaces	Steel	Air – outdoor (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
V	E-46	E.	External surfaces	Steel	Condensation (External)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	E-46	E.1-b	External surfaces	Steel	Condensation (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
V	E-47	D1.1-b	Piping, piping components, and piping elements	Cast austenitic stainless steel	Treated borated water >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No
V	E-47	D1.1-b	Piping, piping components, and piping elements	Cast austenitic stainless steel	Treated borated water >250°C (>482°F)	Loss of fracture toughness/ thermal aging embrittlement	Chapter XI.M12, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-1	E.	Bolting	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
V	EP-1	E.	Bolting	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
V	EP-10	F.	Piping, piping components, and piping elements	Copper alloy	Air – indoor uncontrolled (External)	None	None	No
V	EP-10	F.	Piping, piping components, and piping elements	Copper alloy	Air – indoor uncontrolled (External)	None	None	No
V	EP-11	F.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil (no water pooling)	None	None	No
V	EP-11	Row was deleted since Shuffle Master 1-28.						
V	EP-12	F.	Piping, piping components, and piping	Copper alloy <15% Zn	Air with borated water leakage	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			elements					
V	EP-12	F.	Piping, piping components, and piping elements	Copper alloy <15% Zn	Air with borated water leakage	None	None	No
V	EP-13	A. D1. D2.	Heat exchanger tubes	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	EP-13	A. D1. D2.	Heat exchanger components	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	EP-14	F.	Ducting	Galvanized steel	Air – indoor uncontrolled (External)	None	None	No
V	EP-14	F.	Ducting	Galvanized steel	Air – indoor controlled (External)	None	None	No
V	EP-15	F.	Piping, piping components, and piping elements	Glass	Air – indoor uncontrolled (External)	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-15	F.	Piping, piping components, and piping elements	Glass	Air – indoor uncontrolled (External)	None	None	No
V	EP-16	F.	Piping, piping components, and piping elements	Glass	Lubricating oil	None	None	No
V	EP-16	F.	Piping, piping components, and piping elements	Glass	Lubricating oil	None	None	No
V	EP-17	F.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
V	EP-17	F.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
V	EP-18	F.	Piping, piping components, and piping elements	Stainless steel	Air – indoor uncontrolled (External)	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-18	F.	Piping, piping components, and piping elements	Stainless steel	Air – indoor uncontrolled (External)	None	None	No
V	EP-19	F.	Piping, piping components, and piping elements	Stainless steel	Air with borated water leakage	None	None	No
V	EP-19	F.	Piping, piping components, and piping elements	Stainless steel	Air with borated water leakage	None	None	No
V	EP-2	D2.	Piping, piping components, and piping elements	Aluminum	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
V	EP-2	D2.	Piping, piping components, and piping elements	Aluminum	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
V	EP-20	F.	Piping, piping components, and piping elements	Stainless steel	Concrete	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-20	F.	Piping, piping components, and piping elements	Stainless steel	Concrete	None	None	No
V	EP-21	F.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	None	None	No
V	EP-21	Row was deleted since Shuffle Master 1-28.						
V	EP-22	F.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No
V	EP-22	F.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No
V	EP-24	E.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of preload/ stress relaxation	Chapter XI.M18, “Bolting Integrity”	No
V	EP-24	E.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of preload/ thermal effects, gasket creep, and self-	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						loosening		
V	EP-25	E.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
V	EP-25	E.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
V	EP-26	D2.	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry" The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-26	D2.	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry" for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-27	A. B. D1. D2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-27	A. B. D1. D2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
V	EP-28	F.	Piping, piping components, and piping elements	Glass	Raw water	None	None	No
V	EP-28	F.	Piping, piping components, and piping elements	Glass	Raw water	None	None	No
V	EP-29	F.	Piping, piping components, and piping elements	Glass	Treated water	None	None	No
V	EP-29	F.	Piping, piping components, and piping elements	Glass	Treated water	None	None	No
V	EP-3	F.	Piping, piping components, and piping elements	Aluminum	Air – indoor uncontrolled (Internal/ External)	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-3	F.	Piping, piping components, and piping elements	Aluminum	Air – indoor uncontrolled (Internal/ External)	None	None	No
V	EP-30	F.	Piping, piping components, and piping elements	Glass	Treated borated water	None	None	No
V	EP-30	F.	Piping, piping components, and piping elements	Glass	Treated borated water	None	None	No
V	EP-31	D1. D2.	Piping, piping components, and piping elements	Stainless steel	Soil	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	EP-31	D1. D2.	Piping, piping components, and piping elements	Stainless steel	Soil	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	EP-32	D2.	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-32	D2.	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-33	A. C. D1. D2.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
V	EP-33	A. C. D1. D2.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
V	EP-34	A. D2.	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer/ fouling	Chapter XI.M2, "Water Chemistry"	No
V	EP-34	A. D2.	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer/ fouling	Chapter XI.M2, “Water Chemistry”The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-35	A. D1. D2.	Heat exchanger tubes	Stainless steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
V	EP-35	A. D1. D2.	Heat exchanger tubes	Stainless steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-36	A. B. D1. D2.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	EP-36	A. B. D1. D2.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	EP-37	A. B. D1. D2.	Heat exchanger tubes	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
V	EP-37	A. B. D1. D2.	Heat exchanger components	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
V	EP-38	E.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
V	EP-38	E.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
V	EP-39	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-39	A.	Heat exchanger tubes	Copper alloy	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	EP-4	F.	Piping, piping components, and piping elements	Steel	Air – indoor controlled (External)	None	None	No
V	EP-4	F.	Piping, piping components, and piping elements	Steel	Air – indoor controlled (External)	None	None	No
V	EP-40	Did not exist in Shuffle Master 1-28.						
V	EP-40	A. D1. D2.	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer/ fouling	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-41	Did not exist in Shuffle Master 1-28.						
V	EP-41	A. D1.	Piping, piping components, piping elements, and tanks	Stainless steel	Treated borated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR primary water	No
V	EP-42	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-42	A.	Encapsulation Components	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
V	EP-43	Did not exist in Shuffle Master 1-28.						
V	EP-43	A.	Encapsulation Components	Steel	Air with borated water leakage (Internal)	Loss of material/ general, pitting, crevice and boric acid corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
V	EP-44	Did not exist in Shuffle Master 1-28.						
V	EP-44	A. C. D1. D2.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
V	EP-45	Did not exist in Shuffle Master 1-28.						
V	EP-45	A. D1. D2.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material/ pitting and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-46	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-46	A. D1. D2.	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-47	Did not exist in Shuffle Master 1-28.						
V	EP-47	A. D1. D2.	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer/ fouling	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-48	Did not exist in Shuffle Master 1-28.						
V	EP-48	C.	Piping, piping components, and piping elements	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
V	EP-49	Did not exist in Shuffle Master 1-28.						
V	EP-49	D1.	Pump Casings	Steel with stainless steel cladding	Treated borated water	Cracking/ under-clad cracking	A plant-specific aging management program is to be evaluated.Reference NRC Information Notice 94-63, “Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks."	Yes, verify that plant-specific program addresses under-clad cracking
V	EP-5	F.	Piping, piping components, and	Steel	Concrete	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			piping elements					
V	EP-5	F.	Piping, piping components, and piping elements	Steel	Concrete	None	None	No
V	EP-50	Did not exist in Shuffle Master 1-28.						
V	EP-50	A. D1. D2.	Heat exchanger tubes	Stainless steel	Lubricating oil	Reduction of heat transfer/ fouling	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-51	Did not exist in Shuffle Master 1-28.						
V	EP-51	D1.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	Loss of material/ pitting and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
V	EP-52	Did not exist in Shuffle Master 1-28.						
V	EP-52	D1.	Heat exchanger components	Gray cast iron	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
V	EP-53	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-53	A. D1.	Piping, piping components, piping elements internal surfaces, and tanks	Stainless steel	Condensation (Internal)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
V	EP-54	Did not exist in Shuffle Master 1-28.						
V	EP-54	B. D1. D2.	Piping, piping components, and piping elements	Gray cast iron	Soil	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials"	No
V	EP-55	Did not exist in Shuffle Master 1-28.						
V	EP-55	D1.	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
V	EP-6	F.	Piping, piping components, and piping elements	Steel	Lubricating oil (no water pooling)	None	None	No
V	EP-6	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V	EP-7	F.	Piping, piping components, and piping elements	Steel	Gas	None	None	No
V	EP-7	F.	Piping, piping components, and piping elements	Steel	Gas	None	None	No
V	EP-8	F.	Piping, piping components, and piping elements	Cast austenitic stainless steel	Air – indoor uncontrolled (External)	None	None	No
V	EP-8	Row was deleted since Shuffle Master 1-28.						
V	EP-9	F.	Piping, piping components, and piping elements	Copper alloy	Gas	None	None	No
V	EP-9	F.	Piping, piping components, and piping elements	Copper alloy	Gas	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	L-01	A.1-a	Conductor insulation for electrical cables and connections	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Chapter XI.E1, “Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	L-01	A.1-a	Conductor insulation for electrical cables and connections	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Chapter XI.E1, “Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	L-02	A.1-b	Conductor insulation for electrical cables and connections used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR)	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Chapter XI.E2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	L-02	A.1-b	Conductor insulation for electrical cables and connections used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance (IR)	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation of organics (Thermal/ thermoxidative), radiolysis and photolysis (UV sensitive materials only) of organics; radiation-induced oxidation, and moisture intrusion	Chapter XI.E2, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	L-03	A.1-c	Conductor insulation for inaccessible medium-voltage (2kV to 15kV) cables (e.g., installed in conduit or direct buried)	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by exposure to moisture and voltage	Localized damage and breakdown of insulation leading to electrical failure/ moisture intrusion, water trees	Chapter XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No
VI	L-03	A.1-c	Conductor insulation for inaccessible medium-voltage (2kV to 35kV) cables (e.g., installed in conduit or direct buried)	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by exposure to moisture and voltage	Localized damage and breakdown of insulation leading to electrical failure/ moisture intrusion, water trees	Chapter XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	L-04	A.2-a	Connector contacts for electrical connectors exposed to borated water leakage	Various metals used for electrical contacts	Air with borated water leakage	Corrosion of connector contact surfaces/ intrusion of borated water	Chapter XI.M10, “Boric Acid Corrosion”	No
VI	L-04	A.2-a	Connector contacts for electrical connectors exposed to borated water leakage	Various metals used for electrical contacts	Air with borated water leakage	Corrosion of connector contact surfaces/ intrusion of borated water	Chapter XI.M10, “Boric Acid Corrosion”	No
VI	L-05	B.1-a	Electrical equipment subject to 10 CFR 50.49 EQ requirements	Various polymeric and metallic materials	Adverse localized environment caused by heat, radiation, oxygen, moisture, or voltage	Various degradation/ various mechanisms	EQ is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.4, "Environmental Qualification (EQ) of Electrical Equipment," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii).See Chapter X.E1, “Environmental Qualification (EQ) of Electric Components,” of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	L-05	B.1-a	Electrical equipment subject to 10 CFR 50.49 EQ requirements	Various polymeric and metallic materials	Adverse localized environment caused by heat, radiation, oxygen, moisture, or voltage	Various degradation/ various mechanisms	EQ is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.4, "Environmental Qualification (EQ) of Electrical Equipment," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii).See Chapter X.E1, “Environmental Qualification (EQ) of Electric Components,” of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii).	Yes,TLAA
VI	LP-01	A.	Fuse Holders (Not Part of a Larger Assembly) Metallic Clamp	Copper alloy	Air – indoor	Fatigue/ ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, and oxidation	Chapter XI.E5, "Aging Management Program for Fuse Holders"	No
VI	LP-01	A.	Fuse Holders (Not Part of a Larger Assembly);Metallic Clamp	Copper alloy	Air – indoor	Fatigue/ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion,	Chapter XI.E5, "Fuse Holders"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						and oxidation		
VI	LP-02	A.	Fuse Holders (Not Part of a Larger Assembly)	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Air – indoor uncontrolled (Internal/ External)	None	None	No
VI	LP-02	A.	Fuse Holders (Not Part of a Larger Assembly);Insulation	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Air – indoor uncontrolled (Internal/ External)	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-03	A.	Fuse Holders (Not Part of a Larger Assembly)	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen or > 60-year service limiting temperature	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation (Thermal/ thermoxidative) of organics/thermoplastics, radiation-induced oxidation, moisture intrusion and ohmic heating	Chapter XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-03	A.	Fuse Holders (Not Part of a Larger Assembly);Insulation	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen or > 60-year service limiting temperature	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ degradation (Thermal/ thermoxidative) of organics/thermoplastics, radiation-induced oxidation, moisture intrusion and ohmic heating	Chapter XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-04	A.	Phase bus Bus/connections	Aluminum / Silver Plated Aluminum Copper / Silver Plated Copper; Stainless steel, steel	Air – indoor and outdoor	Loosening of bolted connections/ thermal cycling and ohmic heating	Chapter XI.E4, "Aging Management Program for Bus Ducts"	No
VI	LP-04	A.	Metal enclosed busBus/connections	Aluminum/ Silver Plated Aluminum Copper/ Silver Plated Copper; Stainless steel, steel	Air – indoor and outdoor	Loosening of bolted connections/ thermal cycling and ohmic heating	Chapter XI.E4, "Metal Enclosed Bus"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-05	A.	Phase bus Insulation /insulators	Porcelain ,xenoy, thermo-plastic organic polymers	Air – indoor and outdoor	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ thermal/thermoxidative degradation of organics/thermoplastics, radiation-induced oxidation; moisture/debris intrusion, and ohmic heating	Chapter XI.E4, "Aging Management Program for Bus Ducts"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-05	A.	Metal enclosed busInsulation/insulators	Porcelain,xenoy, thermo-plastic organic polymers	Air – indoor and outdoor	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure/ thermal/thermoxidative degradation of organics/thermoplastics, radiation-induced oxidation; moisture/debris intrusion, and ohmic heating	Chapter XI.E4, "Metal Enclosed Bus"	No
VI	LP-06	A.	Phase bus Enclosure assemblies	Steel, galvanized steel	Air – indoor and outdoor	Loss of material/ general corrosion	Chapter XI.S6, “Structures Monitoring Program”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-06	A.	Metal enclosed busEnclosure assemblies	Steel; galvanized steel	Air – indoor and outdoor	Loss of material/ general corrosion	Chapter XI.S6, “Structures Monitoring Program”	No
VI	LP-07	A.	High voltage insulators	Porcelain,Malleable iron, aluminum, galvanized steel, cement	Air – outdoor	Degradation of insulator quality/ presence of any salt deposits and surface contamination	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VI	LP-07	A.	High voltage insulators	Porcelain,Malleable iron, aluminum, galvanized steel, cement	Air – outdoor	Degradation of insulator quality/presence of any salt deposits or surface contamination	A plant-specific aging management program is to be evaluated for plants located such that the potential exists for salt deposits or surface contamination (e.g., in the vicinity of salt water bodies or industrial pollution).	Yes, plant-specific
VI	LP-08	A.	Transmission conductors and connections	Aluminum, steel	Air – outdoor	Loss of material/ wind induced abrasion and fatigueLoss of conductor strength/ corrosionIncreased resistance of connection/ oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-08	A.	Transmission conductors and connections	Aluminum, steel	Air – outdoor	Loss of material/ wind induced abrasion and fatigueLoss of conductor strength/ corrosionIncreased resistance of connection/ oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VI	LP-09	A.	Switchyard bus and connections	Aluminum, copper, bronze, stainless steel, galvanized steel	Air – outdoor	Loss of material/ wind induced abrasion and fatigueLoss of conductor strength/ corrosionIncreased resistance of connection/ oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-09	A.	Switchyard bus and connections	Aluminum, copper, bronze, stainless steel, galvanized steel	Air – outdoor	Loss of material/ wind induced abrasion and fatigueLoss of conductor strength/ corrosionIncreased resistance of connection/ oxidation or loss of pre-load	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VI	LP-10	A.	Phase bus Enclosure assemblies	Elastomers	Air – indoor and outdoor	Hardening and loss of strength/ elastomer degradation	Chapter XI.S6, “Structures Monitoring Program”	No
VI	LP-10	A.	Metal enclosed busEnclosure assemblies	Elastomers	Air – indoor and outdoor	Hardening and loss of strength/ elastomer degradation	Chapter XI.S6, “Structures Monitoring Program”	No
VI	LP-11	A.	High voltage insulators	Porcelain ,Malleable iron, aluminum, galvanized steel, cement	Air – outdoor	Loss of material/ mechanical wear due to wind blowing on transmission conductors	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VI	LP-11	A.	High voltage insulators	Porcelain ,Malleable iron, aluminum , galvanized steel, cement	Air – outdoor	Loss of material/ mechanical wear due to wind blowing on transmission conductors	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VI	LP-12	A.	Cable Connections (Metallic Parts)	Various metals used for electrical contacts	Air – indoor and outdoor	Loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	Chapter XI.E6, "Electrical Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No
VI	LP-12	A.	Cable Connections (Metallic Parts)	Various metals used for electrical contacts	Air – indoor and outdoor	Loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion,	Chapter XI.E6, "Electrical Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						and oxidation		
VII	A-01	H1.1-b C1.1-b C3. G.	Piping, piping compone nts, and piping elements	Steel (with or without coating or wrapping)	Soil	Loss of material/ general, pitting, crevice, and microbiologic ally influenced corrosion	Chapter XI.M28, “Buried Piping and Tanks Surveillance,” orChapter XI.M34, “Buried Piping and Tanks Inspection”	No Yes, detection of aging effects and operating experience are to be further evaluated
VII	A-01	H1.1-b C1.1-b C3. G.	Piping, piping compone nts, and piping elements	Steel (with or without coating or wrapping)	Soil	Loss of material/ general, pitting, crevice, and microbiologic ally influenced corrosion	Chapter XI.M28, “Buried Piping and Tanks Surveillance,” orChapter XI.M34, “Buried Piping and Tanks Inspection”	No Yes, detection of aging effects and operating experience are to be further evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-02	C1.1-c C3. G.	Piping, piping components, and piping elements	Gray cast iron	Soil	Loss of material/ selective leaching and general corrosion	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	A-02	C1.1-c C3. G. H1. H2.	Piping, piping components, and piping elements	Gray cast iron	Soil	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials"	No
VII	A-03	I.	Closure bolting	Steel	Air with steam or water leakage	Loss of material/ general corrosion	Chapter XI.M18, “Bolting Integrity”	No
VII	A-03	I.2-a	Closure bolting	Steel	Air with steam or water leakage	Loss of material/ general corrosion	Chapter XI.M18, “Bolting Integrity”	No
VII	A-04	I.	Closure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No
VII	A-04	I.2-b	Closure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No
VII	A-05	B.2-a	Cranes - rails	Steel	Air – indoor uncontrolled (External)	Loss of material/ wear	Chapter XI.M23, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-05	B.2-a	Cranes - rails	Steel	Air – indoor uncontrolled (External)	Loss of material/ wear	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
VII	A-06	B.1-a	Cranes - Structural girders	Steel	Air – indoor uncontrolled (External)	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for structural girders of cranes that fall within the scope of 10 CFR 54. See the Standard Review Plan, Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," for generic guidance for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-06	B.1-a	Cranes - Structural girders	Steel	Air – indoor uncontrolled (External)	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for structural girders of cranes that fall within the scope of 10 CFR 54. See the Standard Review Plan, Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," for generic guidance for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-07	B.1-b	Cranes - Structural girders	Steel	Air – indoor uncontrolled (External)	Loss of material/ General corrosion	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
VII	A-07	B.1-b	Cranes - Structural girders	Steel	Air – indoor uncontrolled (External)	Loss of material/ General corrosion	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
VII	A-08	F1.1-a F2.1-a F3.1-a F4.1-a	Ducting and components internal surfaces	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-08	F1.1-a F2.1-a F3.1-a F4.1-a F1.4-a F2.4-a F3.4-a	Ducting and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, crevice, and (for drip pans and drain lines) microbiologically influenced corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
VII	A-09	F1.4-a F2.4-a F3.4-a	Ducting, piping and components external surfaces	Stainless steel	Condensation (External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-09	F1.4-a F2.4-a F3.4-a	Ducting and components	Stainless steel	Condensation	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-10	F1.1-a F1.4-a F2.1-a F2.4-a F3.1-a F3.4-a F4.1-a	Ducting and components external surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-10	F1.1-a F1.4-a F2.1-a F2.4-a F3.1-a F3.4-a	Ducting and components external surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
		F4.1-a						
VII	A-100	E1.8-a	Heat exchanger shell side components including tubes	Stainless steel	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-100	E1.8-a	Heat exchanger components	Stainless steel	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-101	E4.3-a	Piping, piping components, and piping elements	Cast austenitic stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M7, “BWR Stress Corrosion Cracking,” andChapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515)	No
VII	A-101	Row was deleted since Shuffle Master 1-28.						
VII	A-102	I.	Bolting	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
VII	A-102	I.	Bolting	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-103	D.2-a	Closure bolting	Steel	Condensation	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No
VII	A-103	D.2-a	Closure bolting	Steel	Condensation	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
VII	A-104	E1.	Closure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-104	E1.5-a	High-pressure pumpClosure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	Chapter XI.M18, "Bolting Integrity."The AMP is to be augmented by appropriate inspection to detect cracking if the bolts are not otherwise replaced during maintenance.	Yes, if the bolts are not replaced during maintenance
VII	A-105	F1.	Ducting closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-105	F1.1-a F2.1-a F3.1-a F4.1-a I.	Ducting closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-11	F1.4-a F2.4-a F3.4-a	Ducting, piping and components internal surfaces	Steel	Air – indoor uncontrolled (Internal)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-11	Row was deleted since Shuffle Master 1-28.						
VII	A-12	F1.4-a F2.4-a F3.4-a	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Internal)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-12	Row was deleted since Shuffle Master 1-28.						
VII	A-13	F1.1-a F2.1-a F3.1-a F4.1-a	Ducting and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-13	Row was deleted since Shuffle Master 1-28.						
VII	A-15	A3.2-a A3.2-d A3.3-a A3.3-d A3.5-a A3.5-c	Elastomer lining	Elastomers	Treated borated water	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-15	A3.2-a A3.2-d A3.3-a A3.3-d A3.5-a A3.5-c	Elastomer lining	Elastomers	Treated borated water	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant-specific
VII	A-16	A4.2-a A4.2-b A4.3-a A4.3-b A4.5-a A4.5-b	Elastomer lining	Elastomers	Treated water	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant-specific
VII	A-16	A4.2-a A4.2-b A4.3-a A4.3-b A4.5-a A4.5-b	Elastomer lining	Elastomers	Treated water	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant-specific
VII	A-17	F1.1-b F1.4-b F2.1-b F2.4-b F3.1-b F3.4-b F4.1-b	Elastomer seals and components	Elastomers	Air – indoor uncontrolled >35°C (>95°F) (Internal)	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-17	F1.1-b F1.4-b F2.1-b F2.4-b F3.1-b F3.4-b F4.1-b	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Internal/ External)	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-18	F1.1-c F2.1-c F3.1-c	Elastomer seals and	Elastomers	Air – indoor uncontroll	Loss of material/ wear	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
		F4.1-c	compone nts		ed (Internal)			
VII	A-18	F1.1-c F2.1-c F3.1-c F4.1-c	Elastome r seals and compone nts	Elastome rs	Air – indoor uncontroll ed (Internal)	Loss of material/ wear	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-19	G.1-a G.2-a G.3-a G.4-a	Fire barrier penetrati on seals	Elastome rs	Air – indoor uncontroll ed	Increased hardness, shrinkage and loss of strength/ weathering	Chapter XI.M26, “Fire Protection”	No
VII	A-19	G.1-a G.2-a G.3-a G.4-a	Fire barrier penetrati on seals	Elastome rs	Air – indoor uncontroll ed	Increased hardness, shrinkage and loss of strength/ weathering	Chapter XI.M26, “Fire Protection”	No
VII	A-20	G.1-a G.2-a G.3-a G.4-a	Fire barrier penetrati on seals	Elastome rs	Air – outdoor	Increased hardness, shrinkage and loss of strength/ weathering	Chapter XI.M26, “Fire Protection”	No
VII	A-20	G.1-a G.2-a G.3-a G.4-a	Fire barrier penetrati on seals	Elastome rs	Air – outdoor	Increased hardness, shrinkage and loss of strength/ weathering	Chapter XI.M26, “Fire Protection”	No
VII	A-21	G.1-d G.2-d G.3-d G.4-d	Fire rated doors	Steel	Air – indoor uncontroll ed	Loss of material/ wear	Chapter XI.M26, “Fire Protection”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
		G.5-c						
VII	A-21	G.1-d G.2-d G.3-d G.4-d G.5-c	Fire rated doors	Steel	Air – indoor uncontrolled	Loss of material/ wear	Chapter XI.M26, “Fire Protection”	No
VII	A-22	G.1-d G.2-d G.3-d G.4-d	Fire rated doors	Steel	Air – outdoor	Loss of material/ wear	Chapter XI.M26, “Fire Protection”	No
VII	A-22	G.1-d G.2-d G.3-d G.4-d	Fire rated doors	Steel	Air – outdoor	Loss of material/ wear	Chapter XI.M26, “Fire Protection”	No
VII	A-23	H2.2-a H2.3-a	Piping, piping components, and piping elements	Steel	Moist air	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-23	H2.2-a H2.3-a G.	Piping, piping components, and piping elements	Steel	Moist air or condensation (Internal)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
VII	A-24	H1.1-a H1.2-a H1.3-a	Piping, piping components, and piping elements	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-24	H1.1-a H1.2-a H1.3-a	Piping, piping components, and piping elements	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VII	A-25	C2.1-a C2.2-a C2.3-a C2.4-a C2.5-a F1.3-a F2.3-a F3.3-a F4.3-a H2.1-a	Piping, piping components, piping elements, and tanks	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	A-25	C2.1-a C2.2-a C2.3-a C2.4-a C2.5-a F1.3-a F2.3-a F3.3-a F4.3-a H2.1-a	Piping, piping components, piping elements, and tanks	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	A-26	D.1-a D.2-a D.3-a D.4-a D.5-a D.6-a	Compressed air systemPiping, piping components, and piping elements	Steel	Condensation (Internal)	Loss of material/ general and pitting corrosion	Chapter XI.M24, “Compressed Air Monitoring”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-26	D.1-a D.2-a D.3-a D.4-a D.5-a D.6-a	Compressed air systemPiping, piping components, and piping elements	Steel	Condensation (Internal)	Loss of material/ general and pitting corrosion	Chapter XI.M24, “Compressed Air Monitoring”	No
VII	A-27	H2.4-a	Diesel engine exhaust Piping, piping components, and piping elements	Steel; Stainless steel	Diesel exhaust	Loss of material/ general (steel only), pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-27	H2.4-a	Diesel engine exhaustPiping, piping components, and piping elements	Stainless steel; steel	Diesel exhaust	Loss of material/ general (steel only), pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-28	G.8-a	Piping, piping components, and piping elements	Steel	Fuel oil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M26, “Fire Protection,” and Chapter XI.M30, “Fuel Oil Chemistry”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-28	G.8-a	Piping, piping components, and piping elements	Steel	Fuel oil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M26, “Fire Protection,” and Chapter XI.M30, “Fuel Oil Chemistry”	No
VII	A-30	H1.4-a H2.5-a	Piping, piping components, piping elements, and tanks	Steel	Fuel oil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M30, “Fuel Oil Chemistry” The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-30	H1.4-a H2.5-a	Piping, piping components, piping elements, and tanks	Steel	Fuel oil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M30, “Fuel Oil Chemistry”The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-31	C3.1-a C3.2-a C3.3-a	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-31	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-32	C1.2-a C1.5-a C1.6-a H2.1-b	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	A-32	Row was deleted since Shuffle Master 1-28.						
VII	A-33	G.6-a G.6-b	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M27, "Fire Water System"	No
VII	A-33	G.6-a G.6-b	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M27, "Fire Water System"	No
VII	A-34	E1.1-a E1.3-a E1.7-a E1.8-a E3.2-c	Piping, piping components, and piping elements	Steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-34	E1.1-a E1.3-a E1.7-a E1.8-a E3.2-c	Piping, piping components, and piping elements	Steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-35	E4.1-a E4.2-a	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-35	E3. E4.1-a E4.2-a	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-36	F1.1-b F1.4-b F2.1-b F2.4-b F3.1-b F3.4-b F4.1-b	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (External)	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-36	Row was deleted since Shuffle Master 1-28.						
VII	A-37	E4.1-b	Piping, piping components, and piping elements	Steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-37	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-38	C1.1-a	Piping, piping components, and piping elements	Steel (without lining/coating or with degraded lining/coating)	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-38	C1.1-a C1.2-a C1.5-a C1.6-a H2.1-b C3.1-a C3.2-a C3.3-a	Piping, piping components, and piping elements	Steel (with or without lining/coating or with degraded lining/coating)	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, fouling, and lining/coating degradation	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-39	A3.2-a A3.3-a A3.5-a	Piping, piping components, and piping elements	Steel with elastomer lining	Treated borated water	Loss of material/ pitting and crevice corrosion (only for steel after lining degradation)	Chapter XI.M2, “Water Chemistry,” for PWR primary water in EPRI TR-105714The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-39	A3.2-a A3.3-a A3.5-a	Piping, piping components, and piping elements	Steel with elastomer lining	Treated borated water	Loss of material/ pitting and crevice corrosion (only for steel after lining	Chapter XI.M2, “Water Chemistry,” for PWR primary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						degradation)		
VII	A-40	A4.2-a A4.3-a A4.5-a	Piping, piping components, and piping elements	Steel with elastomer lining or stainless steel cladding	Treated water	Loss of material/ pitting and crevice corrosion (only for steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-40	A4.2-a A4.3-a A4.5-a	Piping, piping components, and piping elements	Steel with elastomer lining or stainless steel cladding	Treated water	Loss of material/ pitting and crevice corrosion (only for steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-41	E3.2-a	Piping, piping components, and piping elements	Cast austenitic stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No
VII	A-41	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-42	E3.2-b	Piping, piping components, and piping elements	Cast austenitic stainless steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-42	Row was deleted since Shuffle Master 1-28.						
VII	A-43	C3.1-a C3.2-a	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting and crevice corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	A-43	C3.1-a C3.2-a	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting and crevice corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	A-44	C1.1-a C1.2-a	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	A-44	C1.1-a C1.2-a	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-45	G.6-b	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M27, “Fire Water System”	No
VII	A-45	G.6-b	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M27, “Fire Water System”	No
VII	A-46	F1.2-a F2.2-a F3.2-a F4.2-a	Piping, piping components, and piping elements	Copper alloy	Condensation (External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-46	F1.2-a F2.2-a F3.2-a F4.2-a	Piping, piping components, and piping elements	Copper alloy	Condensation (External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-47	C1.1-a C1.2-a C3.1-a C3.2-a G.6-b	Piping, piping components, and piping elements	Copper alloy >15% Zn	Raw water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-47	C1.1-a C1.2-a C3.1-a C3.2-a G.6-b H2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Raw water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VII	A-50	C2.3-a	Piping, piping components, and piping elements	Gray cast iron	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion, and selective leaching	Chapter XI.M21, "Closed-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
VII	A-50	C2.3-a F3.	Piping, piping components, and piping elements	Gray cast iron	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VII	A-51	C1.5-a	Piping, piping components, and piping elements	Gray cast iron	Raw water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VII	A-51	C1.5-a C3. G. H2.	Piping, piping components, and piping elements	Gray cast iron	Raw water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VII	A-52	C2.2-a	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-52	C2.2-a	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	A-53	C3.2-a	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-53	C3.2-a	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-54	C1.1-a C1.2-a C1.4-a C1.6-a	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-54	C1.1-a C1.2-a C1.4-a C1.6-a	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-55	G.6-a G.6-b	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion, and fouling	Chapter XI.M27, “Fire Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-55	G.6-a G.6-b	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion, and fouling	Chapter XI.M27, "Fire Water System"	No
VII	A-56	A3.3-b	Piping, piping components, and piping elements	Steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
VII	A-56	A3.3-b	Piping, piping components, and piping elements	Steel with stainless steel cladding	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water	No
VII	A-57	E1.1-a E1.3-a E1.7-a E1.8-a	Piping, piping components, and piping elements	Stainless steel	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-57	E1.1-a E1.3-a E1.7-a E1.8-a	Piping, piping components, and piping elements	Stainless steel	Treated borated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-58	A4.1-a A4.6-a E4.1-a	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-58	A4.1-a A4.6-a E4.1-a E3.	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-59	E2.1-a E2.2-a E2.3-a E2.4-a	Piping, piping components, and piping elements	Stainless steel	Sodium pentaborate solution	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-59	E2.1-a E2.2-a E2.3-a E2.4-a	Piping, piping components, and piping elements	Stainless steel	Sodium pentaborate solution >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-60	E3.1-a	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M25, “BWR Reactor Water Cleanup System”	No
VII	A-60	E3.1-a E3.2-a	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M25, “BWR Reactor Water Cleanup System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-61	E4.1-c E4.3-a	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking," andChapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
VII	A-61	E4.1-c E4.3-a	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking," andChapter XI.M2, "Water Chemistry," for BWR water	No
VII	A-62	E3.1-b E3.2-b E4.1-b	Piping, piping components, and piping elements	Stainless steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-62	E3.1-b E3.2-b E4.1-b	Piping, piping components, and piping elements	Stainless steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VII	A-63	A3.4-a A4.4-a E1.8-c E4.4-a C2. E3. F1. F2. F3. F4.	Heat exchanger shell side components	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-63	A3.4-a A4.4-a E1.8-c E4.4-a C2. E3. F1. F2. F3. F4.	Heat exchanger components	Steel	Closed cycle cooling water	Loss of material/ general, pitting, crevice, and galvanic corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	A-64	C1.3-a	Heat exchanger tube side components including tubes	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-64	C1.3-a	Heat exchanger components	Steel	Raw water	Loss of material/ general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-65	C1.3-a	Heat exchanger tube side components including tubes	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-65	C1.3-a	Heat exchanger components	Copper alloy	Raw water	Loss of material/ pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	A-66	C1.3-a	Heat exchanger tube side components including tubes	Copper alloy >15% Zn	Raw water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	A-66	C1.3-a	Heat exchanger components	Copper alloy >15% Zn	Raw water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	A-67	E3.4-b E4.4-a	Heat exchanger shell side components including tubes	Stainless steel; steel with stainless steel cladding	Closed cycle cooling water	Loss of material/ microbiologically influenced corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-67	E3.4-b E4.4-a	Heat exchanger components	Stainless steel; steel with stainless steel cladding	Closed cycle cooling water	Loss of material/ microbiologically influenced corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VII	A-68	E3.4-a	Heat exchanger shell side components including tubes	Stainless steel; steel with stainless steel cladding	Closed cycle cooling water >60°C (>140°F)	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-68	E3.4-a	Heat exchanger components	Stainless steel; steel with stainless steel cladding	Closed cycle cooling water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VII	A-69	E1.8-b	Heat exchanger tube side components including tubes	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking, cyclic loading	Chapter XI.M2, "Water Chemistry,"for PWR primary water in EPRI TR□105714The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-69	E1.8-b	Non-regenerative heat exchanger components	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking, cyclic loading	Chapter XI.M2, "Water Chemistry," for PWR primary water.The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant-specific
VII	A-70	A4.4-b	Heat exchanger tube side components including tubes	Stainless steel; steel with stainless steel cladding	Treated water	Loss of material/ Pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-70	A4.4-b	Heat exchanger components	Stainless steel; steel with stainless steel cladding	Treated water	Loss of material/ Pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-71	E3.4-a	Heat exchanger tube side components including tubes	Stainless steel; steel with stainless steel cladding	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-71	E3.4-a	Heat exchanger components	Stainless steel; steel with stainless steel cladding	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-72	C1.3-b	Heat exchanger tubes	Copper alloy	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	A-72	C1.3-b	Heat exchanger tubes	Copper alloy	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	A-73	F1.1-c F2.1-c F3.1-c F4.1-c	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (External)	Loss of material/ wear	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-73	F1.1-c F2.1-c F3.1-c F4.1-c	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (External)	Loss of material/ wear	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-76	E1.5-a	High-pressure pumpCasing and closure bolting	Stainless steel; steel	Treated borated water	Cracking/ cyclic loading	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-76	E1.5-a	High-pressure pumpCasing	Stainless steel	Treated borated water	Cracking/ stress corrosion cracking, cyclic loading	Chapter XI.M2, "Water Chemistry," for PWR primary waterThe AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-77	I.1-b	External surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-77	I.1-b	External surfaces	Steel	Air – indoor uncontrolled	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(External)			
VII	A-78	I.1-b	External surfaces	Steel	Air – outdoor (External)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-78	I.1-b	External surfaces	Steel	Air – outdoor (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VII	A-79	A3.1-a A3.2-b A3.2-c A3.3-c A3.4-b A3.5-b A3.6-a E1.1-b E1.2-a E1.3-b E1.4-a E1.5-b E1.6-a E1.7-b E1.8-d E1.9-a E1.10-a I.1-a	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-79	A3.1-a A3.2-b A3.2-c A3.3-c A3.4-b A3.5-b A3.6-a E1.1-b E1.2-a E1.3-b E1.4-a E1.5-b E1.6-a E1.7-b E1.8-d E1.9-a E1.10-a I.1-a	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
VII	A-80	D.1-a D.2-a D.3-a D.4-a D.5-a D.6-a	Piping and compone nts external surfaces and bolting	Steel	Air – indoor uncontroll ed (External)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-80	D.1-a D.2-a D.3-a D.4-a D.5-a D.6-a	Piping and compone nts external surfaces	Steel	Air – indoor uncontroll ed (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VII	A-81	I.1-b	External surfaces	Steel	Condens ation (External)	Loss of material/ General	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						corrosion		
VII	A-81	I.1-b	External surfaces	Steel	Condensation (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VII	A-82	G.7-a	Reactor coolant pump oil collection systemTank	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	A plant specific aging management program that determines the thickness of the lower portion of the tank is to be evaluated. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-82	G.7-a	Reactor coolant pump oil collection systemTank	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented to evaluate the thickness of the lower portion of the tank. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-83	G.7-b	Reactor coolant pump oil collection systemPiping, tubing, valve bodies	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	A plant specific aging management program that monitors the degradation of the components is to be evaluated. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	A-83	G.7-b	Reactor coolant pump oil collection systemPiping, tubing, valve bodies	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-84	E1.7-c	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking, cyclic loading	Chapter XI.M2, "Water Chemistry,"for PWR primary water in EPRI TR□105714The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-84	E1.7-c	Heat exchanger components	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking, cyclic loading	Chapter XI.M2, "Water Chemistry," for PWR primary waterThe AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-85	E3.3-d	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-85	E3.3-d	Regenerative heat exchanger components	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-86	A2.1-a	Spent fuel storage racksNeutron-absorbing sheets - PWR	Boraflex	Treated borated water	Reduction of neutron-absorbing capacity/ boraflex degradation	Chapter XI.M22, “Boraflex Monitoring”	No
VII	A-86	A2.1-a	Spent fuel storage racksNeutron-absorbing sheets - PWR	Boraflex	Treated borated water	Reduction of neutron-absorbing capacity/ boraflex degradation	Chapter XI.M22, “Boraflex Monitoring”	No
VII	A-87	A2.1-a	Spent fuel storage racksNeutron-absorbing sheets - BWR	Boraflex	Treated water	Reduction of neutron-absorbing capacity/ boraflex degradation	Chapter XI.M22, “Boraflex Monitoring”	No
VII	A-87	A2.1-a	Spent fuel storage racksNeutron-absorbing sheets - BWR	Boraflex	Treated water	Reduction of neutron-absorbing capacity/ boraflex degradation	Chapter XI.M22, “Boraflex Monitoring”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-88	A2.1-b	Spent fuel storage racksNeutron-absorbing sheets - PWR	Boral,boron steel	Treated borated water	Reduction of neutron-absorbing capacity and loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-88	A2.1-b	Spent fuel storage racksNeutron-absorbing sheets - PWR	Boral,boron steel	Treated borated water	Reduction of neutron-absorbing capacity and loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-89	A2.1-b	Spent fuel storage racksNeutron-absorbing sheets - BWR	Boral,boron steel	Treated water	Reduction of neutron-absorbing capacity and loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	A-89	A2.1-b	Spent fuel storage racksNeutron-absorbing sheets - BWR	Boral,boron steel	Treated water	Reduction of neutron-absorbing capacity and loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-90	G.1-b G.2-b G.3-b G.4-b G.5-a	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling/ freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-90	G.1-b G.2-b G.3-b G.4-b G.5-a	Structural fire barriers: Walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling/ aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-91	G.1-c G.2-c G.3-c G.4-c G.5-b	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-91	G.1-c G.2-c G.3-c G.4-c G.5-b	Structural fire barriers: Walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-92	G.1-b G.2-b G.3-b G.4-b	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling/ freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-92	G.1-b G.2-b G.3-b G.4-b	Structural fire barriers: Walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling/ freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-93	G.1-c G.2-c G.3-c G.4-c	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-93	G.1-c G.2-c G.3-c G.4-c	Structural fire barriers: Walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-94	A1.1-a	Structural Steel	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice	Chapter XI.S6, “Structures Monitoring Program”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						corrosion		
VII	A-94	A1.1-a	Structural Steel	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S6, “Structures Monitoring Program”	No
VII	A-95	H1.4-b	Tanks	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Carbon Steel Tanks”	No
VII	A-95	H1.4-b	Tanks	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Steel Tanks”	No
VII	A-96	A2.1-c	Spent fuel storage racksStorage racks - BWR	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).	No
VII	A-96	A2.1-c	Spent fuel storage racksStorage racks - BWR	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for BWR water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	A-97	A2.1-c	Spent fuel storage racksStorage racks - PWR	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
VII	A-97	A2.1-c	Spent fuel storage racksStorage racks - PWR	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water	No
VII	AP-1	A3. E1.	Piping, piping components, and piping elements	Aluminum	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
VII	AP-1	A3. E1.	Piping, piping components, and piping elements	Aluminum	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
VII	AP-10	J.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil (no water pooling)	None	None	No
VII	AP-10	Row was deleted since Shuffle Master 1-28.						
VII	AP-11	J.	Piping, piping components, and piping	Copper alloy <15% Zn	Air with borated water leakage	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			elements					
VII	AP-11	J.	Piping, piping components, and piping elements	Copper alloy <15% Zn	Air with borated water leakage	None	None	No
VII	AP-12	A3. A4. C2. E1. E3. E4. F1. F2. F3. F4. H1. H2.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice and galvanic corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	AP-12	A3. A4. C2. E1. E3. E4. F1. F2. F3. F4. H1. H2.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	AP-13	J.	Piping, piping components, and piping elements	Galvanized steel	Air – indoor uncontrolled	None	None	No
VII	AP-13	J.	Piping, piping components, and piping elements	Galvanized steel	Air – indoor uncontrolled	None	None	No
VII	AP-14	J.	Piping, piping compone	Glass	Air – indoor uncontroll	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nts, and piping elements		ed (External)			
VII	AP-14	J.	Piping, piping components, and piping elements	Glass	Air – indoor uncontrolled (External)	None	None	No
VII	AP-15	J.	Piping, piping components, and piping elements	Glass	Lubricating oil	None	None	No
VII	AP-15	J.	Piping, piping components, and piping elements	Glass	Lubricating oil	None	None	No
VII	AP-16	J.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
VII	AP-16	J.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
VII	AP-17	J.	Piping, piping compone	Stainless steel	Air – indoor uncontroll	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nts, and piping elements		ed (External)			
VII	AP-17	J.	Piping, piping components, and piping elements	Stainless steel	Air – indoor uncontrolled (External)	None	None	No
VII	AP-18	J.	Piping, piping components, and piping elements	Stainless steel	Air with borated water leakage	None	None	No
VII	AP-18	J.	Piping, piping components, and piping elements	Stainless steel	Air with borated water leakage	None	None	No
VII	AP-19	J.	Piping, piping components, and piping elements	Stainless steel	Concrete	None	None	No
VII	AP-19	J.	Piping, piping components, and piping elements	Stainless steel	Concrete	None	None	No
VII	AP-2	J.	Piping, piping compone	Steel	Air – indoor controlled	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nts, and piping elements		(External)			
VII	AP-2	J.	Piping, piping components, and piping elements	Steel	Air – indoor controlled (External)	None	None	No
VII	AP-20	J.	Piping, piping components, and piping elements	Stainless steel	Dried Air	None	None	No
VII	AP-20	J.	Piping, piping components, and piping elements	Stainless steel	Dried Air	None	None	No
VII	AP-21	J.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil (no water pooling)	None	None	No
VII	AP-21	Row was deleted since Shuffle Master 1-28.						
VII	AP-22	J.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-22	J.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No
VII	AP-25	C1. C3. H2.	Piping, piping components, and piping elements	Steel with internal lining or coating	Raw water	Loss of material/ lining or coating degradation	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	AP-25	Row was deleted since Shuffle Master 1-28.						
VII	AP-26	I.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of preload/ stress relaxation	Chapter XI.M18, "Bolting Integrity"	No
VII	AP-26	I.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of preload/ thermal effects, gasket creep, and self-loosening	Chapter XI.M18, "Bolting Integrity"	No
VII	AP-27	I.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
VII	AP-27	I.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice	Chapter XI.M18, "Bolting Integrity"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						corrosion		
VII	AP-28	I.	Bolting	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, “Bolting Integrity”	No
VII	AP-28	I.	Bolting	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, “Bolting Integrity”	No
VII	AP-29	C1. C3. G. H2.	Piping, piping components, and piping elements	Gray cast iron	Untreated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	AP-29	Row was deleted since Shuffle Master 1-28.						
VII	AP-3	J.	Piping, piping components, and piping elements	Steel	Concrete	None	None	No
VII	AP-3	J.	Piping, piping components, and piping elements	Steel	Concrete	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-30	C1. C2. E1. E4. F1. F2. F3. F4. G. H2.	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-30	C1. C2. E1. E4. F1. F2. F3. F4. G. H2.	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-31	A3. A4. C2. E1. E3. E4. F1. F2. F3. F4. G.	Piping, piping components, and piping elements	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	AP-31	A3. A4. C2. E1. E3. E4. F1. F2. F4. G.	Piping, piping components, and piping elements	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	AP-32	A4. C2. E3. E4. K.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	AP-32	A4. C2. E3. E4.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-33	H2.	Diesel engine exhaust Piping, piping components, and piping elements	Stainless steel	Diesel exhaust	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-33	H2.	Diesel engine exhaustPiping, piping components, and piping elements	Stainless steel	Diesel exhaust	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-34	E1. F1. F3.	Heat exchanger tubes	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	AP-34	E1. F1. F3.	Heat exchanger components	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	AP-35	H1. H2.	Piping, piping components, and piping elements	Aluminum	Fuel oil	Loss of material/ pitting, crevice, and microbiologically influenced	Chapter XI.M30, “Fuel Oil Chemistry” The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						corrosion		
VII	AP-35	H1. H2.	Piping, piping components, and piping elements	Aluminum	Fuel oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M30, “Fuel Oil Chemistry”The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-36	J.	Piping, piping components, and piping elements	Aluminum	Air – indoor controlled (External)	None	None	No
VII	AP-36	J.	Piping, piping components, and piping elements	Aluminum	Air – indoor controlled (External)	None	None	No
VII	AP-37	J.	Piping, piping components, and piping elements	Aluminum	Gas	None	None	No
VII	AP-37	J.	Piping, piping components, and	Aluminum	Gas	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			piping elements					
VII	AP-38	A4. E3. E4.	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry" The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-38	A4. E3. E4.	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-39	H2.	Heat exchanger shell side components	Steel	Lubricating oil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-39	H2.	Heat exchanger components	Steel	Lubricating oil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-4	J.	Piping, piping components, and piping elements	Steel	Dried Air	None	None	No
VII	AP-4	J.	Piping, piping components, and piping elements	Steel	Dried Air	None	None	No
VII	AP-40	G. H2.	Heat exchanger tubes	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-40	G. H2.	Heat exchanger components	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VII	AP-41	F1. F2. F3. F4. G. H2.	Heat exchanger tubes	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-41	F1. F2. F3. F4. G. H2.	Heat exchanger components	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-42	C1. C3. G. H1. H2.	Piping, piping components, and piping elements	Gray cast iron	Soil	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VII	AP-42	Row was deleted since Shuffle Master 1-28.						
VII	AP-43	A3. A4. C2.E1. E3. E4. F1. F2. F3. F4. H1. H2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VII	AP-43	A3. A4. C2. E1. E3. E4. F1. F2. F3. F4. H1. H2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VII	AP-44	H1. H2. G.	Piping, piping components, and piping elements	Copper alloy	Fuel oil (Water as a contaminant)	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M30, "Fuel Oil Chemistry" The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-44	H1. H2. G.	Piping, piping components, and piping elements	Copper alloy	Fuel oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M30, "Fuel Oil Chemistry"The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-45	H2.	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	AP-45	H2.	Piping, piping components, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VII	AP-46	H2.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Raw water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	AP-46	Row was deleted since Shuffle Master 1-28.						
VII	AP-47	C1. C2. E1. E4. G. H2.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material/ pitting, crevice, and galvanic corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-47	C1. C2. E1. E4. G. H2.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material/ pitting and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-48	J.	Piping, piping components, and piping elements	Glass	Air	None	None	No
VII	AP-48	J.	Piping, piping components, and piping elements	Glass	Air	None	None	No
VII	AP-49	J.	Piping, piping components, and piping elements	Glass	Fuel oil	None	None	No
VII	AP-49	J.	Piping, piping components, and piping elements	Glass	Fuel oil	None	None	No
VII	AP-5	J.	Piping, piping components, and piping elements	Steel	Lubricating oil (no water pooling)	None	None	No
VII	AP-5	Row was deleted since Shuffle Master 1-28.						
VII	AP-50	J.	Piping, piping components, and piping elements	Glass	Raw water	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-50	J.	Piping, piping components, and piping elements	Glass	Raw water	None	None	No
VII	AP-51	J.	Piping, piping components, and piping elements	Glass	Treated water	None	None	No
VII	AP-51	J.	Piping, piping components, and piping elements	Glass	Treated water	None	None	No
VII	AP-52	J.	Piping, piping components, and piping elements	Glass	Treated borated water	None	None	No
VII	AP-52	J.	Piping, piping components, and piping elements	Glass	Treated borated water	None	None	No
VII	AP-53	C1. C3.	Piping, piping components, and piping elements	Nickel alloy	Raw water	Loss of material/ pitting and crevice corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-53	C1. C3.	Piping, piping components, and piping elements	Nickel alloy	Raw water	Loss of material/ pitting and crevice corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	AP-54	G. H1. H2.	Piping, piping components, and piping elements	Stainless steel	Fuel oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M30, "Fuel Oil Chemistry"	No
VII	AP-54	G. H1. H2.	Piping, piping components, and piping elements	Stainless steel	Fuel oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M30, "Fuel Oil Chemistry"The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-55	H2.	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	AP-55	H2.	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						corrosion		
VII	AP-56	C1. C3. G. H1. H2.	Piping, piping components, and piping elements	Stainless steel	Soil	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-56	C1. C3. G. H1. H2.	Piping, piping components, and piping elements	Stainless steel	Soil	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-57	C2. E3. K.	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-57	Row was deleted since Shuffle Master 1-28.						
VII	AP-59	C1. C2. E1. E4. H2. G.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-59	C1. C2. E1. E4. H2. G.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-6	J.	Piping, piping components, and piping elements	Steel	Gas	None	None	No
VII	AP-6	J.	Piping, piping components, and piping elements	Steel	Gas	None	None	No
VII	AP-60	C2. E3. E4.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water >60°C (>140°F)	Cracking/ stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-60	C2. E3. E4.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	AP-61	C1. C3. G. H2.	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-61	C1. C3. G. H2.	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	AP-62	A4. E3.	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer/ fouling	Chapter XI.M2, "Water Chemistry"	No
VII	AP-62	A4. E3.	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer/ fouling	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-63	C2. E3. E4.	Heat exchanger tubes	Stainless steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VII	AP-63	C2. E3. E4.	Heat exchanger tubes	Stainless steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VII	AP-64	A4. C2. E3. E4.	Piping, piping components, and piping elements	Copper alloy	Treated water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VII	AP-64	A4. E3. E4.	Piping, piping components, and piping elements	Copper alloy	Treated water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-65	E1. F1. F3.	Heat exchanger tubes	Copper alloy >15% Zn	Treated water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-65	E1. F1. F3.	Heat exchanger components	Copper alloy >15% Zn	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VII	AP-66	I.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
VII	AP-66	I.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
VII	AP-67	K.	Piping, piping components and piping elements	Stainless steel	Waste water (untreated or treated water)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-67	Row was deleted since Shuffle Master 1-28.						
VII	AP-69	K.	Piping, piping components and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-69	Row was deleted since Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-7	J.	Piping, piping components, and piping elements	Cast austenitic stainless steel	Air – indoor uncontrolled (External)	None	None	No
VII	AP-7	Row was deleted since Shuffle Master 1-28.						
VII	AP-70	K.	Piping, piping components and piping elements	Copper alloy	Treated water	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-70	Row was deleted since Shuffle Master 1-28.						
VII	AP-71	K.	Piping, piping components and piping elements	Steel	Condensation (Internal)	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-71	Row was deleted since Shuffle Master 1-28.						
VII	AP-72	K.	Piping, piping components and piping elements	Stainless steel	Condensation (Internal)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-72	Row was deleted since Shuffle Master 1-28.						
VII	AP-73	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-73	E2.	Piping, piping components, and piping elements	Stainless steel	Sodium pentaborate solution	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VII	AP-74	Did not exist in Shuffle Master 1-28.						
VII	AP-74	F1. F2. F3. F4.	Piping, piping components, and piping elements	Aluminum	Condensation	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-75	Did not exist in Shuffle Master 1-28.						
VII	AP-75	C1.	Elastomer seals and components	Elastomers	Raw water	Hardening and loss of strength/ elastomer degradation	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	AP-76	Did not exist in Shuffle Master 1-28.						
VII	AP-76	C1.	Elastomer seals and components	Elastomers	Raw water	Loss of material/ erosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VII	AP-77	Did not exist in Shuffle Master 1-28.						
VII	AP-77	F1. F2. F3. F4.	Heat exchanger tubes	Steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VII	AP-78	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-78	G.	Piping, piping components, and piping elements	Copper alloy	Condensation (Internal)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VII	AP-79	Did not exist in Shuffle Master 1-28.						
VII	AP-79	E1. A2. A3.	Piping, piping components, and piping elements	Stainless Steel; Steel with stainless steel cladding	Treated borated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR primary water	No
VII	AP-8	J.	Piping, piping components, and piping elements	Copper alloy	Dried Air	None	None	No
VII	AP-8	J.	Piping, piping components, and piping elements	Copper alloy	Dried Air	None	None	No
VII	AP-80	Did not exist in Shuffle Master 1-28.						
VII	AP-80	C2. F1. F2. F3.	Heat exchanger tubes	Copper Alloy	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VII	AP-81	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII	AP-81	D.	Piping, piping components, and piping elements	Stainless steel	Condensation (Internal)	Loss of material/ pitting and crevice corrosion	Chapter XI.M24, “Compressed Air Monitoring”	No
VII	AP-82	Did not exist in Shuffle Master 1-28.						
VII	AP-82	E1.	Piping, piping components, piping elements, and tanks	Stainless steel	Treated borated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR primary water	No
VII	AP-83	Did not exist in Shuffle Master 1-28.						
VII	AP-83	G.	Piping, piping components, and piping elements	Aluminum	Raw water	Loss of material/ pitting and crevice corrosion	Chapter XI.M26, “Fire Protection”	No
VII	AP-85	Did not exist in Shuffle Master 1-28.						
VII	AP-85	E1.	Pump Casings	Steel with stainless steel cladding	Treated borated water	Cracking/ under-clad cracking	A plant-specific aging management program is to be evaluated.Reference NRC Information Notice 94-63, “Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks."	Yes, verify plant-specific program addresses under-clad cracking
VII	AP-9	J.	Piping, piping components, and	Copper alloy	Gas	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			piping elements					
VII	AP-9	J.	Piping, piping components, and piping elements	Copper alloy	Gas	None	None	No
VIII	S-01	E.5-d G.1-e G.4-d	Buried piping, piping components, piping elements, and tanks	Steel (with or without coating or wrapping)	Soil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M28, "Buried Piping and Tanks Surveillance," orChapter XI.M34, "Buried Piping and Tanks Inspection"	No Yes, detection of aging effects and operating experience are to be further evaluated
VIII	S-01	E.5-d G.1-e G.4-d	Buried piping, piping components, piping elements, and tanks	Steel (with or without coating or wrapping)	Soil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M28, "Buried Piping and Tanks Surveillance," orChapter XI.M34, "Buried Piping and Tanks Inspection"	No Yes, detection of aging effects and operating experience are to be further evaluated
VIII	S-02	H.2-a	Closure bolting	Steel	Air with steam or water leakage	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-02	H.2-a	Closure bolting	Steel	Air with steam or water leakage	Loss of material/ general corrosion	Chapter XI.M18, “Bolting Integrity”	No
VIII	S-03	H.2-b	Closure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No
VIII	S-03	H.2-b	Closure bolting	High-strength steel	Air with steam or water leakage	Cracking/ cyclic loading, stress corrosion cracking	Chapter XI.M18, “Bolting Integrity”	No
VIII	S-04	A.1-b A.2-b C.1-b C.2-b J.	Piping, piping compone nts, and piping elements	Steel	Steam	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-04	A.1-b A.2-b C.1-b C.2-b	Piping, piping compone nts, and piping elements	Steel	Steam	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-05	B2.1-a B2.2-b	Piping, piping compone nts, and piping elements	Steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-05	B2.1-a B2.2-b	Piping, piping components, and piping elements	Steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water	No
VIII	S-06	A.1-b A.2-b C.1-b C.2-b J.	Piping, piping components, and piping elements	Steel	Steam	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-06	A.1-b A.2-b C.1-b C.2-b	Piping, piping components, and piping elements	Steel	Steam	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-07	B1.1-a B1.2-a	Piping, piping components, and piping elements	Steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134	No
VIII	S-07	B1.1-a B1.2-a	Piping, piping components, and piping elements	Steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary water	No
VIII	S-08	B1.1-b B2.1-c	Piping, piping components, and piping elements	Steel	Steam	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-08	B1.1-b B2.1-c	Piping, piping components, and piping elements	Steel	Steam or treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VIII	S-09	D2.1-b D2.2-b D2.3-b E.1-b E.2-b E.3-a E.5-a E.6-a	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-09	B2. C. D2.1-b D2.2-b D2.3-b E.1-b E.2-b E.3-a E.5-a E.6-a	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-10	D1.1-c D1.2-b D1.3-a E.1-b E.2-b E.3-a E.5-a E.6-a F.1-b F.2-b F.3-a G.1-c G.2-a G.3-a	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
		G.4-a						
VIII	S-10	B1. C. D1.1-c D1.2-b D1.3-a E.1-b E.2-b E.3-a E.5-a E.6-a F.1-b F.2-b F.3-a G.1-c G.2-a G.3-a G.4-a	Piping, piping components, and piping elements	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-11	D1.1-b D2.1-c G.1-b	Piping, piping components, and piping elements	Steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-11	D1.1-b D2.1-c G.1-b	Piping, piping components, and piping elements	Steel	Treated water	Cumulative fatigue damage/ fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3 “Metal Fatigue,” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1).	Yes,TLAA
VIII	S-12	G.1-d	Piping, piping components, and piping elements	Steel	Untreated water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	S-12	G.1-d	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	S-13	E.5-b	Tanks	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-13	E.5-a E.5-b G.4-a G.4-b	Tanks	Steel, Stainless steel	Treated water	Loss of material/ general (steel only), pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-14	E.5-b G.4-b	Tanks	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-14	Row was deleted since Shuffle Master 1-28.						
VIII	S-15	A.1-a A.2-a B1.1-c B1.2-b B2.1-b B2.2-a C.1-a C.2-a J.	Piping, piping components, and piping elements	Steel	Steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No
VIII	S-15	A.1-a A.2-a B1.1-c B1.2-b B2.1-b B2.2-a C.1-a C.2-a	Piping, piping components, and piping elements	Steel	Steam	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, "Flow-Accelerated Corrosion"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-16	D1.1-a D1.2-a D1.3-b D2.1-a D2.2-a D2.3-a E.1-a E.2-a F.1-a F.2-a G.1-a	Piping, piping components, and piping elements	Steel	Treated water	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No
VIII	S-16	D1.1-a D1.2-a D1.3-b D2.1-a D2.2-a D2.3-a E.1-a E.2-a F.1-a F.2-a G.1-a	Piping, piping components, and piping elements	Steel	Treated water	Wall thinning/ flow-accelerated corrosion	Chapter XI.M17, “Flow-Accelerated Corrosion”	No
VIII	S-17	G.5-d	Heat exchanger shell side components	Steel	Lubricating oil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-17	G.5-d	Heat exchanger components	Steel	Lubricating oil	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-18	E.4-a E.4-d	BWR heat exchanger shell side components	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-18	E.4-a E.4-d	Heat exchanger components	Steel	Treated water	Loss of material/ general, pitting, crevice, and galvanic corrosion	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-19	E.4-a E.4-d F.4-a F.4-d	PWR heat exchanger shell side components	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-19	E.4-a E.4-d F.4-a F.4-d	PWR heat exchanger components	Steel	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-20	G.5-d	Heat exchanger shell side components	Stainless steel	Lubricating oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	S-20	G.5-d	Heat exchanger components	Stainless steel	Lubricating oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-21	E.4-a E.4-d	BWR heat exchanger shell side components	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-21	E.4-a E.4-d	Heat exchanger components	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-22	E.4-a E.4-d F.4-a F.4-d	PWR heat exchanger shell side components	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-22	E.4-a E.4-d F.4-a F.4-d	PWR heat exchanger components	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR primary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-23	E.4-e F.4-e G.5-c	Heat exchanger tube side components	Steel	Closed cycle cooling water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VIII	S-23	A. E.4-e F.4-e G.5-c	Heat exchanger components	Steel	Closed cycle cooling water	Loss of material/ general, pitting, crevice, and galvanic corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VIII	S-24	E.4-b F.4-b G.5-a	Heat exchanger tube side components	Steel	Raw water	Loss of material/ general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-24	E.4-b F.4-b G.5-a	Heat exchanger components	Steel	Raw water	Loss of material/ general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VIII	S-25	E.4-e F.4-e G.5-c	Heat exchanger tube side components	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VIII	S-25	E.4-e F.4-e G.5-c	Heat exchanger components	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VIII	S-26	E.4-b F.4-b G.5-a	Heat exchanger tube side components	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-26	E.4-b F.4-b G.5-a	Heat exchanger components	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion, and fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VIII	S-27	G.5-b	Heat exchanger tubes	Steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VIII	S-27	G.5-b	Heat exchanger tubes	Steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VIII	S-28	E.4-c F.4-c G.5-b	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VIII	S-28	E.4-c F.4-c G.5-b	Heat exchanger tubes	Stainless steel	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VIII	S-29	H.1-b	External surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	S-29	H.1-b	External surfaces	Steel	Air – indoor uncontrolled (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VIII	S-30	H.1-a	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-30	H.1-a	External surfaces	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
VIII	S-31	E.5-c G.4-c	Tanks	Steel	Air – outdoor (External)	Loss of material/ general corrosion	Chapter XI.M29, “Aboveground Carbon Steel Tanks”	No
VIII	S-31	E.5-c G.4-c	Tanks	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M29, “Aboveground Steel Tanks”	No
VIII	S-32	H.	Bolting	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, “Bolting Integrity”	No
VIII	S-32	H.	Bolting	Steel	Air – outdoor (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, “Bolting Integrity”	No
VIII	S-33	H.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of preload/ stress relaxation	Chapter XI.M18, “Bolting Integrity”	No
VIII	S-33	H.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of preload/ thermal effects, gasket creep, and self-	Chapter XI.M18, “Bolting Integrity”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						loosening		
VIII	S-34	H.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
VIII	S-34	H.	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M18, "Bolting Integrity"	No
VIII	S-39	F.4-a	Heat exchanger tube side components including tubes	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-39	F.4-a	Heat exchanger components	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR secondary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	S-40	H.	Bolting	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	S-40	H.	Bolting	Steel	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
VIII	S-41	H.1-b	External surfaces	Steel	Air – outdoor (External)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	S-41	H.1-b	External surfaces	Steel	Air – outdoor (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VIII	S-42	H.1-b	External surfaces	Steel	Condensation (External)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	S-42	H.1-b	External surfaces	Steel	Condensation (External)	Loss of material/ general corrosion	Chapter XI.M36, "External Surfaces Monitoring"	No
VIII	SP-1	I.	Piping, piping components, and piping elements	Steel	Air – indoor controlled (External)	None	None	No
VIII	SP-1	I.	Piping, piping components, and piping elements	Steel	Air – indoor controlled (External)	None	None	No
VIII	SP-10	I.	Piping, piping components, and piping	Glass	Lubricating oil	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			elements					
VIII	SP-10	I.	Piping, piping components, and piping elements	Glass	Lubricating oil	None	None	No
VIII	SP-11	I.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
VIII	SP-11	I.	Piping, piping components, and piping elements	Nickel alloy	Air – indoor uncontrolled (External)	None	None	No
VIII	SP-12	I.	Piping, piping components, and piping elements	Stainless steel	Air – indoor uncontrolled (External)	None	None	No
VIII	SP-12	I.	Piping, piping components, and piping elements	Stainless steel	Air – indoor uncontrolled (External)	None	None	No
VIII	SP-13	I.	Piping, piping compone	Stainless steel	Concrete	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nts, and piping elements					
VIII	SP-13	I.	Piping, piping components, and piping elements	Stainless steel	Concrete	None	None	No
VIII	SP-14	I.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil (no water pooling)	None	None	No
VIII	SP-14	Row was deleted since Shuffle Master 1-28.						
VIII	SP-15	I.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No
VIII	SP-15	I.	Piping, piping components, and piping elements	Stainless steel	Gas	None	None	No
VIII	SP-16	D1. F. G. E. D2.	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-16	B1. C. D1. F. G. E. D2.	Piping, piping components, and piping elements	Stainless steel	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry”The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-17	E. D1. F. G.	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-17	B1. C. E. D1. F. G.	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR secondary waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-18	B1.	Piping, piping components, and piping elements	Nickel-based alloys	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134	No
VIII	SP-18	B1.	Piping, piping components, and piping elements	Nickel-based alloys	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-19	E.	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-19	E.	Piping, piping components, and piping elements	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-2	I.	Piping, piping components, and piping elements	Steel	Concrete	None	None	No
VIII	SP-2	I.	Piping, piping components, and piping elements	Steel	Concrete	None	None	No
VIII	SP-23	I.	Piping, piping components, and piping elements	Aluminum	Gas	None	None	No
VIII	SP-23	I.	Piping, piping components, and piping elements	Aluminum	Gas	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-24	D1. D2. E. F. G.	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-24	D1. D2. E. F. G.	Piping, piping components, and piping elements	Aluminum	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-25	A. D1. D2. E. G.	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-25	A. D1. D2. E. G.	Piping, piping components, and piping elements	Steel	Lubricating oil	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-26	E. G.	Piping, piping components, and piping elements	Gray cast iron	Soil	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VIII	SP-26	E. G.	Piping, piping components, and piping	Gray cast iron	Soil	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			elements					
VIII	SP-27	E. F. G.	Piping, piping components, and piping elements	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VIII	SP-27	A. E. F. G.	Piping, piping components, and piping elements	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VIII	SP-28	G.	Piping, piping components, and piping elements	Gray cast iron	Untreated water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VIII	SP-28	A. G.	Piping, piping components, and piping elements	Gray cast iron	Raw water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VIII	SP-29	E. F. G.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Closed cycle cooling water	Loss of material/ selective leaching	Chapter XI.M33, “Selective Leaching of Materials”	No
VIII	SP-29	E. F. G.	Piping, piping compone	Copper alloy >15% Zn	Closed cycle cooling	Loss of material/ selective	Chapter XI.M33, “Selective Leaching of Materials”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			nts, and piping elements		water	leaching		
VIII	SP-3	I.	Piping, piping compone nts, and piping elements	Steel	Lubricatin g oil (no water pooling)	None	None	No
VIII	SP-3	Row was deleted since Shuffle Master 1-28.						
VIII	SP-30	E. F. G.	Piping, piping compone nts, and piping elements	Copper alloy >15% Zn	Raw water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VIII	SP-30	A. E. F. G.	Piping, piping compone nts, and piping elements	Copper alloy >15% Zn	Raw water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VIII	SP-31	E. F. G.	Piping, piping compone nts, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologic ally influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VIII	SP-31	A. E. F. G.	Piping, piping compone nts, and piping elements	Copper alloy	Raw water	Loss of material/ pitting, crevice, and microbiologic ally	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
						influenced corrosion		
VIII	SP-32	A. D1. D2. E. G.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material/ pitting, crevice, and galvanic corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-32	A. D1. D2. E. G.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil	Loss of material/ pitting and crevice corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-33	I.	Piping, piping components, and piping elements	Glass	Air	None	None	No
VIII	SP-33	I.	Piping, piping components, and piping elements	Glass	Air	None	None	No
VIII	SP-34	I.	Piping, piping components, and piping elements	Glass	Raw water	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-34	I.	Piping, piping components, and piping elements	Glass	Raw water	None	None	No
VIII	SP-35	I.	Piping, piping components, and piping elements	Glass	Treated water	None	None	No
VIII	SP-35	I.	Piping, piping components, and piping elements	Glass	Treated water	None	None	No
VIII	SP-36	E. F. G.	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No
VIII	SP-36	E. F. G.	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M20, “Open-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-37	E. G.	Piping, piping components, and piping elements	Stainless steel	Soil	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-37	E. G.	Piping, piping components, and piping elements	Stainless steel	Soil	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-38	A. D1. D2. E. G.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-38	A. D1. D2. E. G.	Piping, piping components, and piping elements	Stainless steel	Lubricating oil	Loss of material/ pitting, crevice, and microbiologically influenced corrosion	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-39	E. F. G.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-39	E. F. G.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VIII	SP-4	I.	Piping, piping components, and piping elements	Steel	Gas	None	None	No
VIII	SP-4	I.	Piping, piping components, and piping elements	Steel	Gas	None	None	No
VIII	SP-40	E. F.	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer/ fouling	Chapter XI.M2, "Water Chemistry"	No
VIII	SP-40	E. F.	Heat exchanger tubes	Stainless steel	Treated water	Reduction of heat transfer/ fouling	Chapter XI.M2, “Water Chemistry”The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-41	E. F. G.	Heat exchanger tubes	Stainless steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
VIII	SP-41	E. F. G.	Heat exchanger tubes	Stainless steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-42	E.	Tanks	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M21, "Closed Cycle Cooling Water System"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-42	E.	Tanks	Stainless steel	Treated water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry”The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-43	B1.	Piping, piping compone nts, and piping elements	Stainless steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134	No
VIII	SP-43	A. B1.	Piping, piping compone nts, and piping elements	Stainless steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for PWR secondary water	No
VIII	SP-44	B1.	Piping, piping compone nts, and piping elements	Stainless steel	Steam	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR secondary water in EPRI TR-102134	No
VIII	SP-44	A. B1.	Piping, piping compone nts, and piping elements	Stainless steel	Steam	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for PWR secondary water	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-45	B2.	Piping, piping components, and piping elements	Stainless steel	Steam	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-45	A. B2.	Piping, piping components, and piping elements	Stainless steel	Steam	Cracking/ stress corrosion cracking	Chapter XI.M2, “Water Chemistry,” for BWR waterThe AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-46	B2.	Piping, piping components, and piping elements	Stainless steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water in BWRVIP-29 (EPRI TR-103515).	No
VIII	SP-46	A. B2.	Piping, piping components, and piping elements	Stainless steel	Steam	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, “Water Chemistry,” for BWR water	No
VIII	SP-48	J.	Piping, piping components, and piping elements	Steel	Steam	Loss of material/ general, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-48	Row was deleted since Shuffle Master 1-28.						
VIII	SP-5	I.	Piping, piping components, and	Copper alloy	Gas	None	None	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
			piping elements					
VIII	SP-5	I.	Piping, piping components, and piping elements	Copper alloy	Gas	None	None	No
VIII	SP-51	J.	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-51	Row was deleted since Shuffle Master 1-28.						
VIII	SP-52	J.	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific
VIII	SP-52	Row was deleted since Shuffle Master 1-28.						
VIII	SP-53	Did not exist in Shuffle Master 1-28.						
VIII	SP-53	G.	Heat exchanger tubes	Copper alloy	Lubricating oil	Reduction of heat transfer/ fouling	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-54	Did not exist in Shuffle Master 1-28.						
VIII	SP-54	E. F. G.	Piping, piping components, and piping elements	Stainless steel	Closed cycle cooling water >60°C (>140°F)	Cracking/ stress corrosion cracking	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VIII	SP-55	Did not exist in Shuffle Master 1-28.						
VIII	SP-55	E. F. G.	Piping, piping components, and piping elements	Copper alloy >15% Zn	Treated water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
VIII	SP-56	Did not exist in Shuffle Master 1-28.						
VIII	SP-56	E. F. G.	Heat exchanger tubes	Copper alloy	Raw water	Reduction of heat transfer/ fouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
VIII	SP-57	Did not exist in Shuffle Master 1-28.						
VIII	SP-57	E.	Heat exchanger tubes	Copper alloy	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VIII	SP-58	Did not exist in Shuffle Master 1-28.						
VIII	SP-58	E. F. G.	Heat exchanger tubes	Copper alloy	Treated water	Reduction of heat transfer/ fouling	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
	59							
VIII	SP-59	B1.	Piping, piping components, and piping elements	Steel	Air – outdoor (Internal)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
VIII	SP-6	I.	Piping, piping components, and piping elements	Copper alloy	Air – indoor uncontrolled (External)	None	None	No
VIII	SP-6	I.	Piping, piping components, and piping elements	Copper alloy	Air – indoor uncontrolled (External)	None	None	No
VIII	SP-60	Did not exist in Shuffle Master 1-28.						
VIII	SP-60	B1. G.	Piping, piping components, and piping elements	Steel	Condensation (Internal)	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No
VIII	SP-61	Did not exist in Shuffle Master 1-28.						
VIII	SP-61	A. F.	Piping, piping components, and piping elements	Copper alloy	Treated water	Loss of material/ pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry"The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, “One-Time Inspection,” for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-	Did not exist in Shuffle Master 1-28.						

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
	62							
VIII	SP-62	G.	Heat exchanger tubes	Stainless steel	Lubricating oil	Reduction of heat transfer/ fouling	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-63	Did not exist in Shuffle Master 1-28.						
VIII	SP-63	G.	Heat exchanger tubes	Steel	Lubricating oil	Reduction of heat transfer/ fouling	Chapter XI.M39, "Lubricating Oil Analysis"The AMP is to be augmented by verifying the effectiveness of the lubricating oil analysis program. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
VIII	SP-64	Did not exist in Shuffle Master 1-28.						
VIII	SP-64	A. E.4-e F.4-e G.5-c	Heat exchanger tubes	Steel	Closed cycle cooling water	Reduction of heat transfer/ fouling	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VIII	SP-7	I.	Piping, piping components, and piping elements	Copper alloy	Lubricating oil (no water pooling)	None	None	No
VIII	SP-7	Row was deleted since Shuffle Master 1-28.						
VIII	SP-8	E. F. G.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

ID	Item	Related	S/C	Material	Environ	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII	SP-8	E. F. G.	Piping, piping components, and piping elements	Copper alloy	Closed cycle cooling water	Loss of material/ pitting, crevice, and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
VIII	SP-9	I.	Piping, piping components, and piping elements	Glass	Air – indoor uncontrolled (External)	None	None	No
VIII	SP-9	I.	Piping, piping components, and piping elements	Glass	Air – indoor uncontrolled (External)	None	None	No