APPENDIX B, TABLE B.2.7

DISPOSITION OF NEI COMMENTS ON CHAPTER VIII OF GALL REPORT

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

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII-1	General comment on System Interface	Include a reference to Section VIII H (Carbon Steel Components) for the external surfaces of piping in each specific section's System Interface paragraph.	The external surfaces of piping etc. is included in the scope of Carbon Steel Components (VIII H). The link between Carbon Steel Components and the individual sections is not clearly established in the System Interface sections of the individual sections.	The external surfaces of piping are included in the scope of carbon steel structures and components in Section H of Chapter VIII. The links between CS components and the individual sections were made by revising the GALL report to include the following sentence in "System, Structures and Components" in Sections A to G of Chapter VIII: "Aging management programs for degradation of external surface of carbon steel components are included in Section H of Chapter VIII." (Similar changes were also made in Chapters V and VII). The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII A-1	A.1.1, A.1.2, A.2.1	Need to add the aging effect loss of material due to general, crevice, and pitting corrosion for carbon steel piping, fittings, and valves that is managed by Water Chemistry, with the reference being EPRI TR-102134, Revision 3 or later.	Carbon steel components are susceptible to this aging effect in this environment. Water Chemistry will manage the aging effect.	Carbon steel piping, fittings, and valves are susceptible to aging mechanisms of general, pitting, and crevice corrosion in a steam environment. These aging mechanisms were added in the GALL report for CS components in the Steam Turbine System by including two additional line items on general, pitting and crevice corrosion for piping and fittings and for valve bodies. The AMPs for these new line items are water chemistry augmented by one-time inspection (XI.M2 and XI.M32 in NUREG-1801, Vol. 2). A similar change was made for steam extraction system piping, fittings, and valves; condensate systems coolers/condensers (treated water side); and steam generator blowdown systems (PWR) blowdown heat exchanger (treated water side). One-time inspection is needed to verify the effectiveness of water chemistry control and confirm the absence of an aging effect. If an aging effect is detected, the results are evaluated to determine the appropriate corrective actions. The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII A-2	System Interface	Include a reference to Section VIII H (Carbon Steel Components) for the external surfaces of carbon steel components in this section.	It is not clear that the external surfaces of carbon steel components are addressed in Section VIII H of the GALL.	See NRC disposition of NEI comment G-VIII-1 in this Appendix B, Table B.2.7.
G-VIII B1-1	B1.1.1, B1.1.2, B1.2.1	Add general corrosion to the Aging Mechanism column.	General corrosion could occur in this environment.	General corrosion is not an aging mechanism of concern in a steam environment with temperatures up to 300°C because this steam is relatively dry and does not provide enough moisture for general corrosion. The GALL report was not revised to address this comment.
G-VIII B1-2	System Interface	Include a reference to Section VIII H (Carbon Steel Components) for the external surfaces of carbon steel components in this section.	It is not clear that the external surfaces of carbon steel components are addressed in Section VIII H of the GALL.	See NRC disposition of NEI comment G-VIII-1 in this Appendix B, Table B.2.7.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII B2-1	B2.2.1	The FAC program described in Section XI is not usually applied to valve bodies. A note stating that the applicant's FAC program must choose bounding locations for the measurement of wall thinning in valves may need to be placed here.	FAC programs generally monitor thinning in pipe locations, since valve bodies are usually much thicker than pipe walls.	Wall thinning in valve bodies is of concern because turbulent flow in the valve bodies can cause flow-accelerated corrosion (FAC). The EPRI program CHECWORKS evaluates valve body FAC susceptibility. The FAC program in XI-M6 (XI-M17 in NUREG-1801, Vol. 2) explains that the applicant's FAC program needs to choose bounding locations for the measurement of components other than piping. AMP XI-M17 of the GALL report was revised to add valve bodies as a component that requires bounding. The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII B2-2	All Items	Thermal Cycling Induced Fatigue is not listed as an Aging Effect. This is unusual in that most other sections list this aging effect, with the resultant AMP of a TLAA.	Consistency is the issue here. Either thermal cycling induced fatigue should be added here or stricken from the other sections. A TLAA is appropriate since this piping is usually design as Non-Class 1 with an assumed number of temperature cycles for 40-year life.	Thermal-cycle induced fatigue is an aging mechanism that may be experienced by non-class 1 components such as main system piping and fittings, but not valves. This aging mechanism was added for non-Class I components that were analyzed for allowable cycles (< 7000 cycles) for the 40-years life. This is a TLAA to be evaluated for the period of extended operation. As a result of this comment, 3 new rows were added in chapter VIII of the GALL report for cumulative fatigue damage: 1) piping and fittings in main steam system (BWR), 2) piping and fittings in main feedwater system (BWR), and 3) piping and fittings in auxiliary feedwater system (PWR). The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII D1-1	D1.1.1	General, Crevice, and Pitting Corrosion, delete one-time inspections from the Aging Management Program column. Revise the Further Evaluation Column to state 'No'.	Operating experience alone has shown the chemistry control program has been effective in controlling corrosion of the Feedwater Systems in plants. Feedwater chemistry parameters are well monitored and well controlled in plants. Routine maintenance on equipment has not shown any concerns over loss of material in feedwater systems.	General, pitting, and crevice corrosion are aging mechanisms that may be experienced by CS piping and fittings in Feedwater Systems in PWR plants. For example, steam generator feedwater nozzle and girth weld heat-affected zone exposed to secondary water have experienced pitting (IN 90-04, NUREG/CR-4868). The appropriate AMP is water chemistry augmented by one-time inspection (XI.M2 and XI.M32 in NUREG-1801, Vol. 2). One-time inspection is needed to verify the effectiveness of water chemistry control and confirm the absence of an aging effect. If an aging effect is detected, the results are evaluated to determine the appropriate corrective actions. The GALL report was not revised to address this comment.
G-VIII D1-2	D1.2.1	The FAC program described in Section XI is not usually applied to valve bodies. A note stating that the applicant's FAC program must choose bounding locations for the measurement of wall thinning in valves may need to be placed here.	FAC programs generally monitor thinning in pipe locations, since valve bodies are usually much thicker than pipe walls.	See NRC disposition of NEI comment G-VIII B2-1 in this Appendix B, Table B.2.7.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII D1-3	D1.2.1	General, Crevice, and Pitting Corrosion, delete one-time inspections from the Aging Management Program column. Revise the Further Evaluation Column to state 'No'.	Operating experience alone has shown the chemistry control program has been effective in controlling corrosion of the Feedwater Systems in plants. Feedwater chemistry parameters are well monitored and well controlled in plants. Routine maintenance on equipment has not shown any concerns over loss of material in feedwater systems.	See NRC disposition of NEI comment G-VIII D1-1 in this Appendix B, Table B.2.7. .
G-VIII D1-4	D1.3.1, D1.3.2	The Flow Accelerated Corrosion should not be the AMP for Wall Thinning. If wall thinning is a concern, thickness measurements of the pump casing should be taken.	FAC programs generally monitor thinning in pipe locations, since valve bodies are usually much thicker than pipe walls.	Wall thinning of pump internals in the steam turbine-driven and motor-driven feedwater pumps need not be monitored by thickness measurements because pump internals have certain tolerances so any thinning of the casing wall will not significantly affect the pump performance. The maintenance program detects the deterioration in performance. Pump casings were deleted from the region of interest for the PWR feedwater system (D1.3.1), condensate system (E.3.1), and the PWR steam generator blowdown system (F.3.1). The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII D1-5	D1.1.1, D1.2.1, D1.3.1, D1.3.2	Entries combine General, Crevice, and Pitting Corrosion, but discussion under Aging Management Program considers only Crevice and Pitting Corrosion. Does one time inspection apply to General Corrosion as well? Should the entries be separated?	Consistency	General, pitting, and crevice corrosion aging mechanisms are experienced by carbon steel pipings and fittings in the main feedwater line, valves, and pump casing and suction and discharge lines associated with the feedwater pump. One-time inspection (XI.M32 in NUREG-1801, Vol. 2) includes detection of loss of material caused by general corrosion. The water chemistry program (XI.M2) of the GALL report was revised to add general corrosion as an aging mechanism for carbon steel components. The GALL report was revised to address this comment.
G-VIII D2-1	D2.1.1, D2.2.1, D2.3.1, D2.3.2	Does Flow Accelerated Corrosion also include the Erosion and/or Erosion-Corrosion aging mechanisms? The FAC program should not be credited for the other mechanisms.	FAC is an applicable aging mechanism for the type of fluid in the components evaluated in this section. Other loss of material mechanisms may be applicable as well, and the FAC program described in the generic program does not include the other mechanisms.	Flow accelerated corrosion (FAC), an applicable aging mechanism for the type of fluid in BWR feedwater system components, is considered in the GALL report to include erosion/corrosion but not the erosion aging mechanisms. FAC and erosion/corrosion are synonymous. Erosion is a mechanical process that requires a plant specific evaluation in the GALL report. The GALL report was not revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII E-1	E.1.1, E.2.1, E.3.1	Under "Aging Effect" should also include loss of material. The "Aging Mechanisms" should be general, crevice and pitting corrosion. Under "References" include EPRI TR-102134 and under "AMP" include description of water chemistry program and the following words "Alternatively, program effectiveness may be demonstrated based on industry or plant specific information." "Evaluation and Technical Basis" should refer to Chapter XI.M11 "Water Chemistry."	Carbon steel exposed to raw water is susceptible to loss of material due to general, crevice and pitting corrosion. Industry or plant specific information may be utilized to demonstrate that preventive measures e.g. chemistry control with addition of corrosion inhibitors, are effective in preventing the aging effect from occurring.	See NRC disposition of NEI comment G-VIII A-1 in this Appendix B, Table B.2.7.
G-VIII E-2	E.4.1– E.4.4 (serviced by open-cycle cooling water)	Under "Aging Mechanism" should also include crevice and pitting corrosion.	Carbon and stainless steel exposed to raw water are susceptible to loss of material due to crevice and pitting corrosion. The corrosion mechanisms may be minimized by chemistry controls.	The carbon and stainless steel tubes, tubesheets, channel heads, and shells of the condensate coolers and condensers exposed to raw water will be susceptible to general, pitting, and crevice corrosion. These aging mechanisms that cause loss of material were added for the condensate coolers/condensers, the steam generator blowdown heat exchangers, and the auxiliary feedwater bearing oil coolers, in Chapter VIII of the GALL report. The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII E-3	E.4.1– E.4.4 (serviced by open-cycle cooling water)	Under "AMP" For Treated Water Side the program relies on preventive measures to minimize corrosion by monitoring and controlling chemistry based on the guidelines of EPRI-TR-102134 for secondary water chemistry in PWR's. Under "Evaluation and Technical Basis," add, "For evaluation and technical basis of the 10 elements of the AMP, see Chapter XI.M11, Water Chemistry."	To provide AMP for secondary side of heat exchanger.	The carbon and stainless steel tubes, tubesheets, channel heads, and shells of the condensate coolers and condensers exposed to treated water will be susceptible to general (carbon steel only), pitting, and crevice corrosion. Because the AMP relies on preventive measures based on the guidelines of EPRI-TR-102134 for secondary water chemistry in PWRs and EPRI-TR-103515 for reactor water chemistry in BWRs, the GALL report was revised to add XI.M3 (XI.M20 in NUREG-1801, Vol. 2), Open Cycle Cooling Water System, for the raw water side, and XI.M11 (M2 in NUREG-1801, Vol. 2), Water Chemistry, for the treated water side of the heat exchanger. A similar change in the GALL report was also made for the steam generator blowdown system heat exchangers. The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII E-5	E.4.1–E.4.4 (serviced by closed-cycle cooling water)	Under "AMP" Delete requirement for performance of functional tests per ASME OM S/G Part 2 and add "If the adequacy of the chemistry control programs cannot be confirmed over the operating history of the plant or if any unexplained downward trend in heat exchanger performance is identified that cannot be remedied by maintenance of an open-cycle system, it may be necessary to selectively perform functional testing of the affected heat exchangers."	NRC Generic Letter 89-13.	The aging management program relies on preventive measures to minimize corrosion by maintaining inhibitors and by performing non-chemistry monitoring consisting of inspection and nondestructive evaluations based on the guidelines of EPRI-TR-107396 for closed-cycle cooling water (CCCW) systems. The inspections for monitoring, other than chemistry, includes data collection and analyses to predict the potential problems such as loss of structural integrity and reduced heat transfer caused by corrosion and/or deposition. These measures ensure that the CCCW systems and components serviced by the CCCW system are performing their function acceptably. The requirement for performance of functional tests per ASME OM S/G Part 2 was deleted in the AMP "Closed-Cycle Cooling Water" (XI.M21 in NUREG-1801, Vol. 2). The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII E-6	E.4.1–E.4.4 (serviced by closed-cycle cooling water)	Under "AMP" For Treated Water Side the program relies on preventive measures to minimize corrosion by monitoring and controlling chemistry based on the guidelines of EPRI-TR-102134 for secondary water chemistry in PWR's. Under "Evaluation and Technical Basis," add, "For evaluation and technical basis of the 10 elements of the AMP, see Chapter XI.M11, Water Chemistry."	To provide AMP for secondary side of heat exchanger.	See NRC disposition of NEI comment G-VIII E-3 in this Appendix B, Table B.2.7.
G-VIII E-7	E.5.1	A separate line item should be created for SS Condensate Storage Tanks. The aging effects would be pitting and crevice corrosion. The AMA would be a plant specific activity based on plant design and management philosophy. Hence further evaluation is warranted.	Existing line item is for stainless steel and carbon steel (-coated) tanks. However, the aging mechanisms exclude general corrosion, which would be applicable to carbon steel only.	Stainless steel condensate storage tanks exposed to a treated water environment are susceptible to pitting and crevice corrosion; under such conditions, uncoated CS condensate storage tanks are also subject to general corrosion. Because tanks composed of different materials are subject to different aging mechanisms, a new line item has been created for SS condensate storage tanks with "Water Chemistry" augmented by "One-time Inspection" (XI.M2 and XI.M32 in NUREG-1801, Vol. 2) as the appropriate AMPs. A similar change was made for the auxiliary feedwater system (PWR) condensate storage (emergency) tank in the GALL report. The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII E-8	E.5.1	Under "AMP" add the following: "Alternatively, program effectiveness may be demonstrated based on industry or plant specific information."	Industry or plant specific information may be utilized to demonstrate that preventive measures e.g. chemistry control with addition of corrosion inhibitors, are effective in preventing the aging effect from occurring.	The suggested AMP for condensate storage tanks exposed to a treated water environment consists of water chemistry augmented by one-time inspection (XI.M2 and XI.M32 in NUREG-1801, Vol. 2). One-time inspection is needed to verify the effectiveness of water chemistry control and confirm the absence of an aging effect. If an aging effect is detected, the results are evaluated to determine the appropriate corrective actions. The applicant has the option of conducting an alternative plant-specific program. The GALL report was not revised to address this comment.
G-VIII E-9	E.5.1 (tank aboveground, external surface)	Under "AMP" and "Evaluation and Technical Basis," substitute with "Plant Specific program."	External corrosion of above ground carbon steel tanks should be addressed on a plant specific basis. Refer to Chapter XI.M7 comments.	"Above Ground Carbon Steel Tanks" (XI.M29 in NUREG-1801, Vol. 2) provides one acceptable AMP for the external corrosion of above ground carbon steel tanks. The applicant has the option of conducting an alternative plant-specific program. The GALL report was not revised to address this comment.
G-VIII E-10	E.5.1 (Tank buried, external surface)	Under "AMP" and "Evaluation and Technical Basis," substitute with "Plant Specific program."	Nuclear industry experience dictates external corrosion of buried components should be addressed on a plant specific basis. Refer to Chapter XI.M8 comments.	See NRC disposition of NEI comment G-XI.M8-1 in this Appendix B, Table B.2.9-2.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII E-11	E.6.1	Under "Aging Mechanism" add general corrosion.	Carbon steel exposed to treated water is susceptible to general corrosion.	The carbon steel components such as piping and fittings, demineralizer, and strainer associated with the condensate cleanup system may be exposed to treated water. Because of their susceptibility to general corrosion, this aging mechanism was included. The GALL report was revised as a result of this comment.
G-VIII E-12	E.4.1-E.4.4	Combine entries for General Corrosion.	General Corrosion is listed as an aging mechanism in two entries for these items. This is an unnecessary duplication and is confusing because different programs are credited.	General corrosion is an aging mechanism of concern for the condensate coolers/condensers serviced by both open-cycle and closed-cycle cooling water. These line entries were not combined because the AMPs are distinctly different for CCCW and OCCW (XI.M20 and XI.M21 in NUREG-1801, Vol. 2). The GALL report was revised by adding a new line item that references "Water Chemistry" augmented by "One-time Inspection" (XI.M2 and XI.M32 in NUREG-1801, Vol. 2) for the treated water side of the heat exchanger. The GALL report was revised to address this comment.
G-VIII E-13	E.5.1	Clarify meaning of "Corrosion."	Mechanism is referred to ambiguously. In remainder of Report, corrosion mechanisms are delineated as General, Crevice, Pitting, etc.	The term corrosion was revised to specifically state "general, pitting, and crevice corrosion." The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII F-1	F.1.1, F.1.2, F.2.1, F.3.1	Aging Management Program (AMP) column: Add the following at the end of the paragraph: "Alternatively, demonstration of an effective Chemistry Control Program by documented plant and or industry operating/maintenance experience also constitute acceptable verification."	Crevice and pitting corrosion occur most frequently in areas of low flow such as joints and connections or points of contact between metals and non-metals. These conditions would typically be found in component internals and flanged connections (such as those associated with valves and pumps), and thus, would be identified during routine or corrective maintenance where disassembly was performed. It should be noted that ASME XI requires a visual examination to determine the condition of Class 1 valve and pump internals at least once each Inspection Interval. When significant corrosion or failed parts are identified on safety related components, the utility corrective action programs require the identification of root cause and in many cases standard metallurgical analyses are employed to define the underlying aging mechanisms. Lack of evidence of crevice or pitting corrosion-related problems in these plant documents provides verification of an effective chemistry control program.	General, pitting, and crevice corrosion occur in carbon steel components such as PWR steam generator blowdown system pipings and fittings and blowdown pump casing exposed to secondary side treated water. Although ASME Section XI requires a visual examination to determine the condition of Class 1 valve and pump internals at least once each inspection interval, this is not relevant to GALL Chpt. VIII discussing Non-Class 1 components. Lack of documented evidence of crevice and pitting corrosion does not imply an absence of the effect of these mechanisms. The applicant has the option of conducting an alternative plant-specific program. The GALL report was not revised as a result of this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII F-2	F.4.1 through F.4.4	Eliminate Buildup of deposit due Biofouling as an Aging mechanism for all heat exchanger components except heat exchanger tubes.	Buildup of deposit due to biofouling is an aging effect which impacts heat transfer intended function, and is thus documented only for heat exchanger tubes. Buildup of deposit does not affect pressure boundary, except for MIC, which is addressed under loss of material.	Biofouling affects both system flow performance and pressure boundary integrity. Flow performance is considered an active function covered under the current licensing basis and should not be included within the scope of license renewal. However, biofouling causes loss of material, which affects the pressure boundary and this passive function requires aging management. This position does not contradict License Renewal Issue No. 98-105 states that the heat transfer function for heat exchangers is within the scope of license renewal. Therefore, biofouling of heat exchanger tubes require aging management. The GALL report was revised as follows to address this comment: 1. Delete all heat exchanger components except the tubes from the material column for buildup of deposits due to biofouling. 2. For all piping and components other than heat exchangers, deleted all line items for buildup of deposits due to biofouling. 3. For all piping and components including heat exchangers, loss of material due to biofouling was included as an aging mechanism for pressure boundary components.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII F-2 (cont.)				4. The aging management program XI.M20 “Open-Cycle Cooling Water System” was revised to remove reference to flow blockage.
G-VIII F-3	F.4.1-F.4.4	Remove reference to Stainless Steel in entry for General Corrosion.	Stainless Steel is not susceptible to General Corrosion.	Blowdown heat exchangers serviced by closed-cycle cooling water consist of SS tubes, CS tubesheet, CS channel head and access cover. The SS tubes are not susceptible to general corrosion. The GALL report was revised to address this comment by clarifying that only CS components are subject to this aging mechanism and that both SS and CS components are subject to pitting and crevice corrosion aging mechanisms..

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII G-1	G.1.1	The Flow Accelerated Corrosion is not valid Aging Mechanism for Auxiliary Feedwater. Delete this entry.	Flow Accelerated Corrosion (FAC) is listed as an Aging Mechanism for the AFW Piping. FAC of this piping is not plausible because the temperature of the water is near ambient temperature and the system is typically in standby. The AFW pumps take suction from a Condensate Storage Tank that is not heated. Industry experience indicates that FAC is not plausible for cold water systems with good chemistry control and infrequent operation. Therefore, FAC is not plausible for this piping and this entry should be removed. This position was accepted in the CCNPP SER.	The flow accelerated corrosion (FAC) of auxiliary feedwater (AFW) lines of recirculating steam generators with preheaters is of concern. In plants with these steam generators (Westinghouse Models D4, D5, and E steam generators), a portion of the main feedwater is diverted to the auxiliary feedwater line via a preheater bypass line during normal operation. As a result, a portion of the auxiliary feedwater line between steam generator and the bypass line connection experiences FAC. At one plant, this portion of the auxiliary feedwater line has experienced significant wall thinning because of FAC. Reference: NRC IN 92-07, “Rapid Flow-Induced Erosion/Corrosion of Feedwater Piping.” FAC is a concern for AFW piping and fittings in plants with preheated steam generators. The GALL report was not revised as a result of this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII G-2	G.1.1, G.1.2	Revise Environment from '<90ºC …Steam Generator' to be just 'Treated Water'.	The temperatures as stated are confusing.	The temperatures were intended to convey a sense of the treated water's general low temperature and the preheated sections high temperatures, since both temperatures apply for this environment. The environment is now denoted simply as treated water. The GALL report was revised to address this comment.
G-VIII G-4	G.1.1, G.1.2	Delete entry for Biofouling.	The only passive intended function for the components in question is the pressure boundary function. Buildup of Deposit/Biofouling does not affect the components' ability to accomplish this intended function, so this Effect/Mechanism should not be considered.	See NRC disposition of NEI comment for G-VIII-F-2 in this Appendix B, Table B.2.7.
G-VIII G-5	G.4.1	Clarify meaning of "Corrosion."	Mechanism is referred to ambiguously. In remainder of Report, corrosion mechanisms are delineated as General, Crevice, Pitting, etc.	See NRC disposition of NEI comment for G-VIII-E-13 in this Appendix B, Table B.2.7.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII G-6	G.5.1-G.5.3	Remove reference to Stainless Steel in entry for General Corrosion.	Stainless Steel is not susceptible to General Corrosion.	AFW bearing oil coolers for steam-turbine pumps are serviced by closed-cycle and open-cycle cooling water and are subjected to treated water, open water, and lubricating oil environments. The SS shells, tubes, or tubesheets are not susceptible to general corrosion. The GALL report was revised to address this comment by clarifying that only CS components are subject to this aging mechanism and that both SS and CS components are subject to pitting and crevice corrosion aging mechanisms.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII G-7	G.1.1, G.1.2	(1) Entry for piping combines General, Crevice, and Pitting Corrosion, but discussion under Aging Management Program considers only Crevice and Pitting Corrosion. (2) Does one time inspection apply to General Corrosion as well? (3) Should the entries be separated? (4) Also, later entries for pumps and valves do not include General Corrosion. (5) Why is General Corrosion not an AERM (aging effect requiring management) for these entries given same materials and environment?	Consistency	(1 and 2) The AMP of water chemistry augmented by one-time inspection (XI.M2 and XI.M32 in NUREG-1801, Vol. 2), was revised to address general, pitting, and crevice corrosion. A one-time inspection applies to general corrosion as well. (3) Since the aging effect of general, pitting, and crevice corrosion is identically "loss of material, these three aging mechanisms are best handled in the same line item with the same AMP (water chemistry augmented by one-time inspection). (4 and 5) AFW pump casings and valve bodies are composed of carbon steel and are subject to general, pitting, and crevice corrosion. The entries for pumps and valves were revised to include general corrosion as an applicable aging effect. The GALL report was revised to address this comment for parts 1, 2, 4, and 5.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII H-1	H.1.1	Revise Structure and Component "Carbon Steel Components (PWR's) to read "Carbon Steel Components and Closure Bolting (PWR's).	Bolting is not a component; as such it should not be called out separately in other sections in chapter VIII. Chapter XI.M5, "Boric Acid Corrosion" applies. There is no need to distinguish bolting from other pressure boundary external surfaces relative to boric acid corrosion.	GALL VIII, Section H on Carbon Steel Components includes AMPs for degradation of all carbon steel structures and components, including closure bolting. ASME Section XI treats individual bolting as a component and requires inspection of individual bolting. The line item for BAC of external surfaces refers to those PWR carbon steel components that do not contain borated coolant. The components containing borated coolant are addressed in other sections of Chapter VIII. The GALL report was not revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII H-2	H.1.1	Delete reference to ASME section XI in program description for BAC.	Implementation of the Boric Acid Corrosion Program at the sites has nothing to do with ASME Section XI. This program is performed independent of Section XI for the identification of boric acid corrosion. Most utilities perform this inspection at the start of the outage to identify problems so that they may be repaired while off-line. Leakage identified during the performance of pressure tests and hydrostatic tests are handled per the ASME Code requirements.	The Boric Acid Corrosion (BAC) Program is based on NRC Generic Letter 88-05, which is a stand alone program to monitor the reactor coolant boundary for borated water leakage. ASME Section XI, which is independent of the boric acid corrosion program, is a code requirement to identify leakage during the performance of pressure tests and hydrostatic tests. Staff considers the ASME Section XI inspections to be non-related to the boric acid corrosion program and has removed reference to ASME Section XI from the BAC program. The GALL report was revised to address this comment.
G-VIII H-3	H.1.1	Atmospheric corrosion is only applicable to carbon steel components associated with portions of systems operating below 212ºF.	Since moisture is necessary for general, pitting and any other forms of atmospheric corrosion, the external surfaces of carbon steel components, which operate above 212ºF, are not susceptible to loss of material due to corrosion.	Several carbon steel components in the Steam and Power Conversion System are exposed to temperatures lower than 212°F, and are therefore susceptible to general corrosion. Corrosion mechanisms are delineated throughout the GALL report as general (incorporating atmospheric), pitting, crevice, etc. The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII H-4	H.1.1	Delete reference to XI.S8, "Coating Program" under Aging Management Program Column for atmospheric corrosion. Plant specific review should be performed.	The use of coatings is a preventive measure to minimize or preclude the loss of material due to corrosion. Loss or degradation of coatings does not result in loss of material, and thus is not considered an aging effect. Programs credited for monitoring loss of material typically constitute periodic visual inspections of component external surfaces for signs of corrosion or loss of material. As programs credited vary between plant sites, a plant specific review should be performed.	The external surfaces of BWR and PWR carbon steel components are subjected to air, moisture, and humidity resulting in loss of material caused by general corrosion. (The term "atmospheric corrosion" was replaced with "general corrosion" to be consistent with similar changes in Chapters V and VII). A plant-specific aging management program needs to be evaluated for these conditions. Reference to AMP XI.S8 "Protective Coating Monitoring and Maintenance Program" was removed. The GALL report was revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII H-5	H.2.1	(1) Delete "Air, Moisture, Humidity and Leaking Fluid" under Environment Column for Closure Bolting. Replace with "Air, Leaking Chemically treated Borated Water." (2) Delete "Atmospheric Corrosion" under Aging Mechanism column and replace with "Boric Acid Corrosion." Replace information in References column, Aging Management Program column and Evaluation and Technical Basis column with that provided in H.1.1 for Boric Acid Corrosion.	Most carbon or low alloy steel bolting is in a dry environment and coated with a lubricant, thus general corrosion of bolting has not been a major concern in the industry. Corrosion of fasteners has only been a concern where leakage of a joint occurs, specifically, when exposed to aggressive chemical attack such as that resulting from borated water leaks. Aging effect requiring management should be loss of mechanical closure integrity due to aggressive chemical attack (boric acid corrosion).	(1) Closure bolting in high-pressure or high-temperature BWR or PWR systems is exposed to "Air, Moisture, Humidity and Leaking Fluid." Chemically treated borated water is applicable only to PWRs. (2) Boric acid corrosion of PWR closure bolting is addressed in the first line item for Section H on Carbon Steel Components. This bolting also experiences atmospheric corrosion (the term "atmospheric corrosion" was replaced with "general corrosion" to be consistent with similar changes in Chapters V and VII). Item H.2.1 represents both PWR and BWR closure bolting. The GALL report was not revised to address this comment.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII H-6	H.2.1	Delete Aging Effect/Mechanism "Loss of Pre-load due to Stress Relaxation."	Loss of pre-load of mechanical closures can occur due to settling of mating surfaces, relaxation after cyclic loading, gasket creep, and loss of gasket compression due to differential thermal expansion. The effects of these mechanisms are the same as that of a degraded gasket; that is, the potential for leakage of internal fluid at the mechanical joint. Since the ASME code does not consider gaskets, packing, seals, and O-rings to perform a pressure retaining function, these components are typically not considered to support an intended function and not within the scope of license renewal. Thus, with the exception of Class 1 components and those cases where a gasket or seal is utilized to provide a radiological barrier, the aging mechanisms associated with loss of pre-load, described above are not considered to require management. Class 1 components credit ISI Inspection to address loss of pre-load due to stress relaxation.	See NRC disposition of NEI comment for G-VII-I-6 in this Appendix B, Table B.2.6.

Table B.2.7: Disposition of NEI Comments on Chapter VIII of GALL Report (continued)

Comment Number	Item Number	Comment/Proposed Change	Basis for Comment	NRC Disposition
G-VIII H-7	H.2.1	Delete Aging Effect/Mechanism "Crack Initiation/Growth" due to Cyclic loading, Stress Corrosion Cracking.	Although there have been a few instances of cracking of bolting in the industry due to SCC, these have been attributed to high yield stress materials and contaminants, such as the use of lubricants containing MoS_2. For quenched and tempered low alloy steels (e.g., SA193 Grade B7) used for closure bolting material, susceptibility to SCC is controlled by yield strength. Additionally, operating experience and existing data indicate that SCC failure should not be a significant issue for the bolting materials of SA193 Grade B7.	See disposition of NEI comment G-VII I-7 in this Appendix B, Table B.2.6.

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