NUCLEAR ENERGY INSTITUTE

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Dr. P. T. Kuo
Program Director, License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

PROJECT NUMBER: 690

Dear Dr. Kuo:

We are providing industry comments on the draft Generic Aging Lessons Learned (GALL) report update material as placed on the NRC website on September 30, 2004. This material included draft revisions to NUREG-1800, Standard Review Plan for License Renewal Applications for Nuclear Power Plants (SRP), and NUREG-1801, Generic Aging Lessons Learned (GALL) Report. We understand that these documents will be further revised and provided for public comment in late January 2005. We request a 90-day comment period for this material and believe that your schedule for completing the GALL update by September 30, 20005, can accommodate this comment period extension.

The NEI review of the draft revisions and the majority of the comments in this document are focused on the tables of Volume 2, Chapters II through VIII of the GALL report, which present the generic aging management review results. The revisions to these tables were coordinated with a database (GALL Master 9-30.xls) which in turn was used as a basis for the creation of a new Chapter IX and changes to the SRP. The resolution of comments in this document will require corresponding corrections to Chapter IX of the GALL report and to the SRP.

A few changes were made to the SRP that were unrelated to the GALL changes. For example, a revision of the text of Section 3.1.2.2.2 eliminated the exception to augmented steam generator ISI if no general corrosion pitting exists. NEI comments on these changes will be withheld until the basis document is available.

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NEI review comments are provided in two categories. The first category includes comments on what appears to be errors made in the conversion of the original GALL (GALL 2001) tables into the new GALL (GALL 2005) tables. Editorial errors, such as misspellings and errors in table formatting have not been addressed since the January 2005 version of the documents is expected to receive a more thorough review for such errors. Errors that appear to be readily apparent, i.e., those to which both the NRC staff and the industry should agree with little discussion, have been identified in the first category of comments. These comments are in Enclosure 1. We request that these errors be addressed before the January 2005 versions of the documents are issued, which should minimize the review effort during the public comment period.

The second category of comments addresses apparent errors and other issues that will require more extensive discussion to resolve. These comments will be provided during the public comment period following issuance of the documents in January 2005. Brief summaries of the types of apparent errors and issues that are expected to be the subject of additional NEI comments are provided in Enclosure 2.

Please contact me (202-739-8080; am@nei.org) or Fred Emerson (202-739-8086; fae@nei.org) with any questions about this information.

Sincerely,

Alex Marion

Enclosures

c: Mr. Jerry Dozier, NRC
Document Control Desk

Comments on Revised Chapter II Containment Structures Tables

II.A1	**Concrete Containments (Reinforced and Prestressed)**						
II.A2	**Steel Containments**						
C-03	II.A1.1-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: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), of the below-grade environment is aggressive (ph < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program, Note: 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.	A plant-specific aging management program is required for inaccessible areas as stated
Aggressive environment may or may not exist in this line. If we are assuming there is no aging management review required unless environment is aggressive (reasonable approach consistent with mechanical systems tables), then this environment is correct. However, in the line below, the environment of water should be water – flowing to be consistent. Also, "of" (in AMP column) should be "if". Comments apply to all cases of C-03							
C-02	II.A1.1-b	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Water	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 for to leaching of calcium hydroxide. Inaccessible Areas: A plant-specific aging management program is required for below-grade inaccessible areas (basemat and concrete wall), if the concrete is exposed to flowing water (NUREG-1557). An aging management program is not required, even if	A plant-specific aging management program is required for inaccessible areas as stated

						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.	
For inaccessible areas, the environment of water – flowing, presumably with soil, would be appropriate. For the accessible areas, outside air would seem appropriate. Either define, in Chapter IX, how "water" is to apply to both areas, or modify the environment here. Also, "for" in the AMP column should be "due". Comments apply to all cases of C-02.							
C-05	II.A1.1-e	Concrete: Dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete; carbon steel	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, "ASME Section XI, Subsection IWL". Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking, loss of bon, and loss of material (spalling, scaling) due to corrosion of embedded steel. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), if the below-grade environment is aggressive (ph<5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. Note: 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, a plant-specific aging management program is required for inaccessible areas as stated
In the AMP column, "S6" should be "S2," "bon" should be "bond" and "be" should be inserted before "included." Also, could clarify "as stated" by replacing it with "if the environment is aggressive." Comments apply to all cases of C-05.							

II.A3	**Common Components**						
C-16	II.A3.2-a	Personnel airlock; equipment hatch	Steel	Air – indoor uncontrolled	Loss of material/ corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE," Chapter XI.S4, "10 CFR Part 50, Appendix J," and If 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."	No No No
Add air – outdoor to environment to be consistent with C-17 and C-18. Comment applies to all cases of C-16.							
C-18	II.A3.3-a	Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Seals, 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
Remove "seals: from materials column. Comment applies to all cases of C-18.							
II.B1.1	**Steel Containments**						
C-19	II.B1.1.1-a	Steel elements: Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; ECCS suction header NOTE: Inspection of	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ 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.	Yes, if corrosion is significant for inaccessible areas

		containment supports is addressed by ASME Section XI, Subsection IWF (see III.B1.3) This is essentially same as C-09, except for the structural components.				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 required. (continued) Chapter XI.S4, "10 CFR Part 50, Appendix J" If 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"	 No No
It is not clear why the component description was modified here. Consider restoring text from original GALL. Also, air outside containment would still be air - indoor uncontrolled since the primary containment is enclosed in the secondary containment. Eliminate "or air - outdoor." Comments apply to all cases of C-19.							
B2.2	**Concrete Containments**						
C-03	II.B2.2.1-b	Concrete <u>Dome; wall; basemat; ring girder; buttresses</u>	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: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), of the below-grade environment is aggressive (ph < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program, Note: 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.	A plant-specific aging management program is required for inaccessible areas as stated
Component should be Containment; basemat.							

C-08	II.B2.2.1-g	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program The 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.
Component should be Containment; concrete fill in annulus; basemat.							
C-06	II.B2.2.1-e	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Soil	Cracks and distortion due to increased stress levels/ 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
Component should be All.							
C-02	II.B2.2.1-a	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Water	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 for to leaching of calcium hydroxide.	A plant-specific aging management program is required for inaccessible areas as stated

						Inaccessible Areas: A plant-specific aging management program is required for below-grade inaccessible areas (basemat and concrete wall), if the concrete is exposed to flowing water (NUREG-1557). An aging management program is not required, 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.	
Component should be Containment; basemat.							
C-04	II.B2.2.1-c	Concrete: <u>Dome; wall; basemat; ring girders; buttresses</u>	Concrete	Any	Expansion and cracking/ reaction with aggregates	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 investigations, test, 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 the stated conditions are satisfied for inaccessible areas
Component should be Containment; basemat.							
C-05	II.B2.2.1-d	Concrete: <u>Dome; wall; basemat; ring girders; buttresses; reinforcing steel</u>	Concrete; carbon steel	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, “ASME Section XI, Subsection IWL”. Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking, loss of bon, and loss of material (spalling, scaling) due to corrosion of embedded steel. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), if the below-grade environment is aggressive (ph<5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. Note: periodic monitoring of below-grade water	Yes, a plant-specific aging management program is required for inaccessible areas as stated

						chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is aggressive or non-aggressive.	
Component should be Containment; basemat; reinforcing steel.							
C-20	II.B2.2.2-c	Steel elements: <u>Torus; vent line; vent header; vent line bellows; downcomers</u> Essentially same as C-14, except for the structural components	Stainless steel; carbon 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
Component should be Vent header, downcomers.							
C-21	II.B2.2.2-d	Steel elements: <u>Torus; vent line; vent header; vent line bellows; downcomers</u> Essentially same as C-13, except for the structural components	Stainless steel; carbon 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).	Yes, TLAA
Component should be Vent header, downcomers.							
C-16	II.B4.2-a	Personnel airlock; equipment hatch	Steel	Air – indoor uncontrolled	Loss of material/ corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE," Chapter XI.S4, "10 CFR Part 50, Appendix J," and If 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	No No No

						operation. See Chapter XI.S8, “Protective Coating Monitoring and Maintenance Program.”	
C-17	II.B4.2-b	Personnel airlock; equipment hatch: Locks, hinges, and closure mechanisms	Steel	Air – indoor uncontrolled or air outdoor	Loss of leak tightness/ mechanical wear of locks, hinges and closure mechanisms	Chapter XI.S4, “10 CFR Part 50, Appendix J” and Plant Technical Specifications	No
Add “CRD hatch to component list in both of the above lines.							

Comments on Revised Chapter III Structures and Component Supports Tables

III.A1.	**Group 1 Structures (BWR Reactor Bldg., PWR Shield Bldg., Control Rm./Bldg.)**						
T-05	III.A1.1-e	Concrete: Below-grade exterior; foundation	Reinforced concrete	Aggressive environment	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Inaccessible Areas: A plant-specific aging management program is required (may be a part of structures monitoring program) <u>is</u> the below-grade environment is aggressive (ph < 5.5, chlorides > 500ppm, or sulfates > 1500ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. Note: 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, a plant-specific aging management program is required for inaccessible areas <u>as stated</u>
In the AMP column, “is’ should be “if.” Also, could clarify “as stated” by replacing it with “if the environment is aggressive.” Comments apply to all cases of T-05 and T-07							
T-09	III.A1.1-I	Concrete: Foundation; subfoundation	Reinforced concrete; porous concrete	<u>Flowing water</u> 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
Change Flowing water to Water – flowing for consistency with Chapter IX.							
III.A6	**Group 6 Structures (Water-Control Structures)**						
T-19	III.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 <u>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</u>	No

						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 required.	
The second paragraph in the AMP column was incorrectly copied from a line evaluating corrosion of embedded steel (see T-18). Restore the original text for this line from III.A6.1-e which relates to concrete. .							
T-21	III.A6.2-a	Steel components: All structural members	Steel; Copper alloys	Air – indoor uncontrolled or air - outdoor	Loss of material/ 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 If protective coatings are relied upon to manage the effects of aging, this AMP is to include requirements to address protective coating monitoring and maintenance.	No
Not clear why copper alloy was added to this line which focuses on steel structural components. Suggest adding a new line to address copper.							
III.A7	**Group 7 Structures (Concrete Tanks and Missile Barriers)**						
III.A8	**Group 8 Structures (Steel Tanks and Missile Barriers)**						
T-23	III.A7.2-b	Steel components: Fuel pool liner	Stainless steel	Water – standing	Cracking/ stress corrosion cracking Loss of material/pitting and crevice corrosion	Plant-specific aging management program	Yes
This line is also T-14 in III.A5 where fuel pool liner is the appropriate component. However, for III.A7 and A8, the component should be "tank liners."							
III.A	**Multiple Sections**						
T-12	III.A3.3-a	Masonry walls: All	Concrete block	Air – indoor uncontrolled	Cracking/ restraint; shrinkage; creep; aggressive environment	Chapter XI.S5, "Masonry Wall Program"	No
This line is used in several sections of Chapter III.A. In most sections the environment of air – indoor uncontrolled is appropriate. In some sections however, such as A3 and A6 which include outdoor structures, the environment is not sufficiently inclusive. Adding air – outdoor would help.							

Comments on Revised Chapter IV RCS Tables

Item	Link	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
IV.A1.	**Reactor Vessel (BWR)**						
R-66 And R-65	IV.A1.3-c And IV.A1.3-b	Nozzles Control rod drive return line And Feedwater	Steel (without lining/ coating or with degraded lining/ coating)	Reactor coolant	Cracking/ cyclic loading	Chapter XI.M6, "BWR Control Rod Drive Return Line Nozzle"	No
Original GALL and NEI submittal both said "with or without stainless steel cladding." As it is, the line does not apply if cladding is intact. Cracking due to cyclic loading should be independent of cladding (or coating). Believe this material was miss-stated.							
R-62 and R-63	IV.A1.2-c and IV.A1.2-d	Vessel shell Intermediate beltline shell Beltline welds	Steel (without lining/ coating or with degraded lining/ coating)	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…..	Yes, TLAA
Original GALL said "with cladding" and NEI submittal said "with or without stainless steel cladding." As it is, the line does not apply if cladding is intact. Irradiation embrittlement should be independent of cladding (or coating). Believe this material was miss-stated.							
IV.A2	**Reactor Vessel (PWR)**						
R-84	IV.A2.5-a	Vessel shell Upper shell Intermediate 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 10^{17} n/cm2 (E >1 MeV) at the end of the license renewal term. The TLAA . . .	Yes, plant specific
Further evaluation should be "Yes, TLAA" to be consistent with original GALL. This was error in NEI submittal.							
IV.B1.	**Reactor Vessel Internals (BWR)**						
R-97	IV.B1.1-g	Core shroud and core plate#*#Shroud support structure (shroud support cylinder, shroud support plate, shroud support legs)	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 and Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
The component for this line does not match the original GALL. Should be "Core shroud and core plate, LPCI coupling"							

IV.B2.	**Reactor Vessel Internals (PWR) - Westinghouse**						
R-122	IV.B2.3-c	Core barrel Core barrel (CB) CB flange (upper) CB outlet nozzles Thermal shield	Stainless steel	Reactor coolant <u>>250°C (>482°F)</u> and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	Applicant must provide a commitment which includes the following elements: (1) to participate in industry programs for investigating and managing aging effects applicable to Reactor Internals, (2) to evaluate and implement the results of the industry programs as applicable to the Reactor Internals design and, (3) to submit, for NRC review and approval an inspection plan for Reactor Internals, as based on industry recommendation, at least 24 months prior to the extended	No, but Licensee commitment to be confirmed.
482°F threshold is normally associated with thermal embrittlement of CASS. Not clear why it is used here. Note that some other lines with CASS and embrittlement (e.g., R-101 and R-103) have not used the threshold. This is not a major issue since the component type dictates the temperature range, but it is an inconsistency.							
IV.B3.	**Reactor Vessel Internals (PWR) - Combustion Engineering**						
R-161	IV.B3.4-c	<u>Core barrel Assembly</u> <u>Core barrel cylinder (top and bottom flange)</u> <u>Lower internals assembly to-core barrel bolts</u> <u>Core barrel-to-thermal shield bolts</u> <u>Baffle plates and formers</u>	Stainless steel	Reactor coolant and neutron flux	Loss of fracture toughness/ neutron irradiation embrittlement, void swelling	Applicant must provide a commitment which includes the following elements: (1) to participate in industry programs for investigating and managing aging effects applicable to Reactor Internals, (2) to evaluate and implement the results of the industry programs as applicable to the Reactor Internals design and, (3) to submit, for NRC review and approval an inspection plan for Reactor Internals, as based on industry recommendation, at least 24 months prior to the extended period.	No, but Licensee commitment to be confirmed.
Component description not consistent with original GALL.							

IV.B4.	**Reactor Vessel Internals (PWR) – Babcock & Wilcox**						
R-125	IV.B4.5-g	Baffle/former Assembly Baffle/former bolts	Stainless steel	Reactor coolant and high fluence (>1 x 10E21 n/cm2 E >0.1 MeV)	Cracking/ stress corrosion cracking, irradiation-assisted stress corrosion cracking	Applicant must provide a commitment which includes the following elements: (1) to participate in industry programs for investigating and managing aging effects applicable to Reactor Internals, (2) to evaluate and implement the results of the industry programs as applicable to the Reactor Internals design and, (3) to submit, for NRC review and approval an inspection plan for Reactor Internals, as based on industry recommendation, at least 24 months prior to the extended period.	No, but Licensee commitment to be confirmed.
This line is one of two that links to IV.B4.5-g. The other (R-198) matches the original GALL while this one has different component, environment and AMP descriptions. Believe this entry is in error.							
IV.C1	**Reactor Coolant Pressure Boundary (BWR)**						
R-16	IV.C1.4-b	Isolation condenser tube side components	Stainless steel, 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) The AMP in Chapter XI.M1 is to be augmented to detect cracking . . .	Yes, plant specific
Add parenthetical phrase (steel only) following general corrosion.							
IV.E	**Common Miscellaneous Material Environment Combinations**						
Consider deleting "External" designation from environments. Since no aging effects are identified for these combinations, the combination would be equally true for internal surfaces.							

RP-08	RP-08	Piping, piping components, and piping elements	Stainless steel	Treated borated water	None	None	No
The NEI submittal requested the addition of a MEAP combination of stainless steel in treated borated water with loss of material (due to pitting and crevice corrosion) and the water chemistry program (XI.M2 with no one-time inspection). While these aging mechanisms are virtually non-existent for stainless steel in these systems, it is because the water chemistry program maintains the proper environment. To be consistent with other MEAPs involving stainless steel in treated water, this line should be deleted and the line requested in the NEI submittal should be added to each system. Overall treatment of stainless steel in treated water (both borated and non-borated) environments is inconsistent in both the new and old GALL and will be the subject of further comments during the public comment period.							

Comments on Revised Chapter V ESF Tables

Item	Link	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
V.A.	**Containment Spray System (PWR)**						
EP-13	EP-13	Heat exchanger tubes	Copper alloy <15% Zn	Closed cycle cooling water	Loss of material/ pitting, crevice corrosion and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
This comment applies to all instances of item EP-13. Where this line is used, a second line should be added. The second line should address copper alloy >15% Zn. The aging effect should include selective leaching and the AMP should include XI.M33, "Selective Leaching of Materials." This will be resolved with the inclusion of line EP-27 (See NEI MEAP Final_40_updated 101504 - JRL Comments.doc)							
EP-23	EP-23	Piping, piping components, and piping elements internal surfaces	Stainless steel	Treated borated water	Loss of material/ boric acid corrosion	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
This comment applies to all instances of EP-23. First NEI submittal suggested this line as an added MEAP, but no mechanisms were included. Since mechanisms are still being used in GALL, the correct mechanism here is pitting and crevice corrosion, the same as it is for treated water in some BWR systems (see line A-58).							
E-17	V.A.6-c	Heat exchanger shell side components	Steel	Closed cycle cooling water	Macrofouling and loss of material/ general, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
Macrofouling should not be effect here. Neither original GALL items nor E-17 from NEI submittal had this effect. Eliminate "Macrofouling and."							
E-20	V.A.6-a	Heat exchanger shell side components including tubes	Stainless steel	Raw water	Macrofouling and loss of material/ general, pitting, crevice, and microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and." Also, stainless steel is not susceptible to general corrosion. Eliminate "general."							
E-18	V.A.6-a	Heat exchanger shell side components including tubes	Steel	Raw water	Macrofouling and loss of material/ general, pitting, crevice, and microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							

V.B.	**Standby Gas Treatment System (BWR)**						
E-40	V.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
Must assume this item refers to bolting only and not ducting since ducting external surfaces are covered under E-26. Pitting and crevice corrosion were not mechanisms in the original GALL item (V.B.1-a) nor are these mechanisms assumed in other lines where steel is exposed to indoor air with only limited wetting (see definition of air-indoor uncontrolled). It is also not clear why this new bolting line was added for this system but not for others, such as the containment spray system.							
E-05	V.B.1-b	Elastomer seals	Elastomers	Air – indoor uncontrolled (External)	Hardening and loss of strength/ elastomers degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
E-06	V.B.2-b V.B.1-b	Elastomer seals	Elastomers	Air – indoor uncontrolled >35°C (>95°F) (Internal/ External)	Hardening and loss of strength/ elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
External in line E-06 is redundant to line E-05, which is external air of any temperature. Eliminate "External" from environment of E-06. Degradation of elastomers in line E-05 is result of either temperature (since temperatures could be above 95°F in this environment) or exposure to UV radiation. Definition of "Air – indoor uncontrolled" in Chapter IX should be expanded to state that UV radiation is part of the environment for system external surfaces. Alternatively, and more correctly, the environment of line E-05 should be changed to "Air – indoor uncontrolled >35°C (>95°F) (External) or exposed to UV radiation."							
V.C.	**Containment Isolation Components**						
E-32	V.C.1-a	Containment isolation piping and components external surfaces	Steel	Untreated water	Loss of material/ general, pitting, crevice corrosion, 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
This line should be for internal surfaces. Line E-30 for condensation and E-35 for air are for external surfaces.							
E-30	V.C.1-a	Containment isolation piping and components internal surfaces	Steel	Condensation (External)	Loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
This line should be for external surfaces consistent with the environment. Also, steel in a frequently wetted environment of condensation should include pitting and crevice corrosion.							

E-22	V.C.1-a	Containment isolation piping and components internal surfaces	Steel	Raw water	Macrofouling and 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
This instance of macrofouling was missed in previous file. Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling in previous submittal. Eliminate "Macrofouling and."							
E-36	V.C.1-b	Containment isolation piping and components internal surfaces	Stainless steel	Raw water	Macrofouling and 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
This line retained Macrofouling and did not restore biofouling – should be consistent, preferably without macrofouling. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and" and add "and biofouling."							
E-34	V.C.1-b	Containment isolation piping and components internal surfaces	Stainless steel	Untreated water	Macrofouling and loss of material/ 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
This line added macrofouling as effect. Should not apply to untreated water – was not applied to steel in line E-32. Eliminate "Macrofouling and."							
V.D1.	**Emergency Core Cooling System (PWR)**						
E-17	V.D1.6-a V.D1.5-a	Heat exchanger shell side components	Steel	Closed cycle cooling water	Macrofouling and loss of material/ general, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
Macrofouling should not be effect here. Neither original GALL items nor E-17 had this effect. Eliminate "Macrofouling and."							
E-20	V.D1.6-b	Heat exchanger shell side components including tubes	Stainless steel	Raw water	Macrofouling and loss of material/ general, pitting, crevice, and microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments Eliminate "Macrofouling and." Also, stainless steel is not susceptible to general corrosion. Eliminate "general."							

E-18	V.D1.6-b	Heat exchanger shell side components including tubes	Steel	Raw water	Macrofouling and loss of material/ general, pitting, crevice, and microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							
E-39	V.D1.7-a	Safety injection tank (accumulator)	Steel with stainless steel cladding	Air with borated water leakage	Loss of material/ boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
Not clear why this line added. Line E-39 is for exterior steel surfaces (cladding is irrelevant and confusing here) which are covered in E-28 (which otherwise has redundant link to V.D1.7-a).							
E-38	V.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
Not clear why this line added. Line E-12 covers stainless in treated borated water >140F. Component description of E-12 includes "tanks" and link includes V.D1.7-b. Since safety injection tanks are at ambient containment temperature which is much less than 140F, this line (E-38) will not normally apply. For any unusual configurations where temperature is high, line E-12 should suffice.							
V.D2.	**Emergency Core Cooling System (BWR)**						
Is it correct to assume that the added line about ventilation systems in the opening text is just a pointer to VII.F2, rather than an expansion of the scope of the ECCS? Suggest clarifying or deleting the line.							
E-04	V.D2.5-b	Drywell and suppression chamber spray system (internal) surfaces: Flow orifice Spray nozzles	Steel	Air – indoor uncontrolled (Internal)	Macrofouling and loss of material/ general corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
GALL originally only addressed plugging from general corrosion (so our submittal used "from" rather than "and"). Now both plugging and loss of material are being addressed. Change "and" to "from." Also, it is not clear why plugging (macrofouling) is an effect applicable to license renewal.							
E-17	V.D2.4-c	Heat exchanger shell side components	Steel	Closed cycle cooling water	Macrofouling and loss of material/ general, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
Macrofouling should not be effect here. Neither original GALL items nor E-17 had this effect. Eliminate "Macrofouling and."							

E-20	V.D2.4-a	Heat exchanger shell side components including tubes	Stainless steel	Raw water	Macrofouling and loss of material/ general, pitting, crevice, and microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and." Also, stainless steel is not susceptible to general corrosion. Eliminate "general."							
E-18	V.D2.4-a	Heat exchanger shell side components including tubes	Steel	Raw water	Macrofouling and loss of material/ general, pitting, crevice, and microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							
E-14	V.D2.1-e	Piping, piping components, and piping elements internal surfaces	Stainless steel	Condensation (Internal/ External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
To be consistent with other links to V.D2.1-e (lines E-26 and E-27 are for steel in air externally and condensation internally) this line should address condensation only internally, which is also consistent with the component description. Eliminate "External."							
E-15	V.D2.3-c	Piping, piping components, and piping elements with 4 inch and larger nominal diameter	Stainless steel	Raw water	Cracking/ stress corrosion cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking," and Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
The environment here should be reactor coolant (note AMP is for primary water)							
E-11	V.D2.1-d	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
This line is for a BWR. Eliminate "borated."							

E-12	V.D2.3-c V.D2.1-c	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 in EPRI TR-105714	No
Should just be treated water in BWR and water chemistry should be for BWRs. This is consistent with original GALL lines in link. Also note that E-37 more correctly addresses aging mechanisms in old V.D2.1-c. The link to V.D2.1-c should be deleted in this line.							
E-29	V.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
E-27	V.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
These lines are the internal counterparts of line E-26. Add "Ducting" to component description for consistency.							
V.E	**External Surfaces of Components and Miscellaneous Bolting**						
EP-25	EP-25	Closure bolting	Steel	Air – indoor uncontrolled (External)	Loss of material/ general, pitting and crevice corrosion	Chapter XI.M.18, "Bolting Integrity"	No
As with E-40 above, this environment does not lead to pitting and crevice corrosion. Either delete pitting and crevice corrosion or change the environment to condensation which was created to address frequently wetted conditions that would lead to pitting and crevice corrosion.							
V.F.	**Common Miscellaneous Material Environment Combinations**						
Consider deleting "External" designation from environments. Since no aging effects are identified for these combinations, the combination would be equally true for internal surfaces.							
Delete EP-2 (which has AMP) to be consistent with opening text.							
EP-12	EP-12	Piping, piping components, and piping elements	Copper alloy <15% Zn	Air with borated water leakage	None	None	No
Air with borated water leakage implies an external surface which is subject to contamination in some circumstances. The environment is thus potentially aggressive so pitting and crevice corrosion are possible. This line should be deleted.							

EP-23	EP-23	Piping, piping components, and piping elements	Stainless steel	Treated borated water	None	None	No
The NEI submittal requested the addition of a MEAP combination of stainless steel in treated borated water with loss of material (due to pitting and crevice corrosion) and the water chemistry program (XI.M2 with no one-time inspection). While these aging mechanisms are virtually non-existent for stainless steel in these systems, it is because the water chemistry program maintains the proper environment. To be consistent with other MEAPs involving stainless steel in treated water, this line should be deleted and the line requested in the NEI submittal should be added to appropriate systems. Overall treatment of stainless steel in treated water (both borated and non-borated) environments is inconsistent in both the new and old GALL and will be the subject of further comments during the public comment period.							

Comments on Revised Chapter VII Auxiliary Systems Tables

Item	Link	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VII.A3.	**Spent Fuel Pool Cooling and Cleanup (PWR)**						
AP-12	AP-12	Piping, piping components, and piping elements	Copper alloy <15% Zn	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
This comment applies to all instances of item AP-12. Where this line is used, a second line should be added. The second line should address copper alloy >15% Zn. The aging effect should include selective leaching and the AMP should include XI.M33, "Selective Leaching of Materials." This will be resolved with the inclusion of line AP-43 (See NEI MEAP Final_40_updated 101504 - JRL Comments.doc)							
A-63	VII.A3.4-a	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
AP-24	AP-24	Heat exchanger shell side components <u>including tubes</u>	Steel	Closed cycle cooling water	Loss of material/ general, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-63 is redundant to (encompassed by) AP-24, and could be deleted							
VII.A4.	**Spent Fuel Pool Cooling and Cleanup (BWR)**						
AP-32	AP-32	Piping, piping components, and piping elements	Copper alloy >15% Zn	<u>Treated water</u>	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
AP-31	AP-31	Piping, piping components, and piping elements	Gray cast iron	<u>Treated water</u>	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
The choice of treated water as the environment is not clear. Treated water is a possible environment in the spent fuel pool cooling and cleanup system, but the other possible aging effects/mechanisms for the combination do not show up (e.g., steel in treated water with loss of material due to general pitting and crevice corrosion is not listed). Closed-cycle cooling water is a possible environment, and may actually be the more likely environment for these materials. Since the inclusion of AP-43 (see AP-12 above) will address copper alloy >15%Zn in closed-cycle cooling water for this system, if the AP-32 environment is changed to closed-cycle cooling water, the line will be redundant, so the AP-32 line should be deleted.							
Wherever (i.e., in all relevant systems) separate lines have been added to address selective leaching, the other common aging mechanisms should be included in the line. For the above lines this would be pitting and crevice corrosion for copper and general, pitting and crevice corrosion for gray cast iron. Water chemistry should be added to the AMP column. This will provide consistency with other similar lines.							

A-63	VII.A4.4-a	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
AP-24	AP-24	Heat exchanger shell side components including tubes	Steel	Closed cycle cooling water	Loss of material/ general, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-63 is redundant to (encompassed by) AP-24, and could be deleted							
VII.C1	**Open-Cycle Cooling Water System (Service Water System)**						
A-65	VII.C1.3-a	Heat exchanger tube side components including tubes	Copper alloy <15% Zn	Raw water	Loss of material/ pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Biofouling should be associated with loss of material and macrofouling should be deleted. See Macrofouling/Biofouling at end of comments. Eliminate "macrofouling/."							
A-66	VII.C1.3-a	Heat exchanger tube side components including tubes	Copper alloy >15% Zn	Raw water	Macrofouling/ biofouling and loss of material/ pitting, crevice, microbiologically influenced corrosion, and selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials	No
Biofouling should be associated with loss of material and macrofouling should be deleted. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling/ biofouling and" and add "biofouling" after "corrosion."							
A-64	VII.C1.3-a	Heat exchanger tube side components including tubes	Steel	Raw water	Loss of material/ general, pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Biofouling should be associated with loss of material and macrofouling should be deleted. See Macrofouling/Biofouling at end of comments. Eliminate "macrofouling/."							
A-44	VII.C1.2-a VII.C1.1-a						
A-49	VII.C1.1-a VII.C1.2-a						
A-51	VII.C1.5-a						
A-54	VII.C1.4-a VII.C1.6-a VII.C1.2-a VII.C1.1-a						

A-32	VII.C1.5-a VII.C1.6-a VII.C1.2-a						
A-38	VII.C1.1-a						
For the lines above, biofouling should be associated with loss of material and macrofouling should be deleted. See Macrofouling/Biofouling at end of comments. Eliminate "macrofouling/."							
VII.C2.	**Closed-Cycle Cooling Water System**						
AP-32	AP-32	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
AP-31	AP-31	Piping, piping components, and piping elements	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
The choice of treated water as the environment is not clear. For the closed-cycle cooling system, treated water (in the sense of BWR primary fluid) is possible but unlikely. For this system these environments should be changed to closed-cycle cooling water. Since the inclusion of AP-43 (see AP-12 above) will address copper alloy >15%Zn in closed-cycle cooling water for this system, if the AP-32 environment is changed to closed-cycle cooling water, the line will be redundant, so the AP-32 line should be deleted.							
VII.D	**Compressed Air System**						
A-103	VII.D.	Closure bolting	Steel	Saturated air	Loss of material/ general, pitting and crevice corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No
This is the only place saturated air is used as an environment. Suggest changing to Condensation which is the new equivalent. See comment on saturated air in Chapter IX below.							
VII.E1.	**Chemical and Volume Control System (PWR)**						
Why was line about pitting and crevice corrosion for stainless steel in treated borated water removed from the beginning text? The effects were not added to the section and the same line still exists in the text for other systems.							
A-63	VII.E1.8-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
AP-24	AP-24	Heat exchanger shell side components including tubes	Steel	Closed cycle cooling water	Loss of material/ general, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-63 is redundant to (encompassed by) AP-24, and could be deleted							

AP-34	AP-34	Heat exchanger tubes	Copper alloy <15% Zn	Treated water	Loss of material/ pitting, crevice corrosion and galvanic corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
Believe that environment is closed cycle cooling water, given the AMP.							
VII.E2.	**Standby Liquid Control System (BWR)**						
A-59	VII.E2.1-a VII.E2.4-a VII.E2.2-a VII.E2.3-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
Original GALL did not include one time inspection requirement. AMP was only water chemistry and further evaluation was No.							
VII.E3.	**Reactor Water Cleanup System**						
AP-32	AP-32	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
AP-31	AP-31	Piping, piping components, and piping elements	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
The choice of treated water as the environment is not clear. Treated water is a possible environment in the reactor water cleanup system, but the other possible aging effects/mechanisms for the combination do not show up (e.g., steel in treated water with loss of material due to general pitting and crevice corrosion is not listed). Closed-cycle cooling water is a possible environment, and may actually be the more likely environment for these materials. Since the inclusion of AP-43 (see AP-12 above) will address copper alloy >15%Zn in closed-cycle cooling water for this system, if the AP-32 environment is changed to closed-cycle cooling water, the line will be redundant, so the AP-32 line should be deleted.							

VII.E4.	**Shutdown Cooling System (Older BWR)**						
A-63	VII.E4.4-a	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
AP-24	AP-24	Heat exchanger shell side components including tubes	Steel	Closed cycle cooling water	Loss of material/ general, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-63 is redundant to (encompassed by) AP-24, and could be deleted							
AP-32	AP-32	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
AP-31	AP-31	Piping, piping components, and piping elements	Gray cast iron	Treated water	Loss of material/ selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
The choice of treated water as the environment is not clear. For the shutdown cooling system, has a likely environment of treated water, but closed-cycle cooling water is also a possible environment, and may actually be the more likely environment for these materials. Since the inclusion of AP-43 (see AP-12 above) will address copper alloy >15%Zn in closed-cycle cooling water for this system, if the AP-32 environment is changed to closed-cycle cooling water, the line will be redundant, so the AP-32 line should be deleted.							
VII.F1.	**Control Room Area Ventilation System**						
A-14	VII.F1.1-a	Ducting and components internal surfaces	Galvanized steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	VII.F1.1-a	Ducting and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
Steel and galvanized steel were listed separately in the NEI submittal to highlight the slight difference between the two materials in an air – indoor uncontrolled environment. With the inclusion of line AP-13 in table J, that difference is established. For the two lines above, where the materials share the same effects in a wetted environment, the lines could be combined; especially since the definition of steel includes galvanized steel.							
A-46	VII.F1.2-a	Piping, piping components, and piping elements	Copper alloy >15% Zn	Condensation (External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
This line should be repeated for Copper alloy <15% Zinc. See Copper Alloy at end of comments.							

VII.F2.	**Auxiliary and Radwaste Area Ventilation System**						
A-14	VII.F1.1-a	Ducting and components internal surfaces	Galvanized steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	VII.F1.1-a	Ducting and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
Steel and galvanized steel were listed separately in the NEI submittal to highlight the slight difference between the two materials in an air – indoor uncontrolled environment. With the inclusion of line AP-13 in table J, that difference is established. For the two lines above, where the materials share the same effects in a wetted environment, the lines could be combined; especially since the definition of steel includes galvanized steel.							
A-46	VII.F2.2-a	Piping, piping components, and piping elements	Copper alloy >15% Zn	Condensation (External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
This line should be repeated for Copper alloy <15% Zinc. See Copper Alloy at end of comments.							
VII.F3.	**Primary Containment Area Ventilation System**						
A-14	VII.F1.1-a	Ducting and components internal surfaces	Galvanized steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	VII.F1.1-a	Ducting and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
Steel and galvanized steel were listed separately in the NEI submittal to highlight the slight difference between the two materials in an air – indoor uncontrolled environment. With the inclusion of line AP-13 in table J, that difference is established. For the two lines above, where the materials share the same effects in a wetted environment, the lines could be combined; especially since the definition of steel includes galvanized steel.							
A-46	VII.F3.2-a	Piping, piping components, and piping elements	Copper alloy >15% Zn	Condensation (External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
This line should be repeated for Copper alloy <15% Zinc. See Copper Alloy at end of comments.							

VII.F4.	**Diesel Generator Building Ventilation System**						
A-14	VII.F1.1-a	Ducting and components internal surfaces	Galvanized steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	VII.F1.1-a	Ducting and components internal surfaces	Steel	Condensation (Internal)	Loss of material/ general, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
Steel and galvanized steel were listed separately in the NEI submittal to highlight the slight difference between the two materials in an air – indoor uncontrolled environment. With the inclusion of line AP-13 in table J, that difference is established. For the two lines above, where the materials share the same effects in a wetted environment, the lines could be combined; especially since the definition of steel includes galvanized steel.							
A-46	VII.F4.2-a	Piping, piping components, and piping elements	Copper alloy >15% Zn	Condensation (External)	Loss of material/ pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
This line should be repeated for Copper alloy <15% Zinc. See Copper Alloy at end of comments.							
VII.G.	**Fire Protection**						
A-45	VII.G.6-b	Piping, piping components, and piping elements	Copper alloy <15% Zn	Raw water	Loss of material/ pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	Chapter XI.M27, "Fire Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments . Eliminate "macrofouling/."							
A-47	VII.G.6-b	Piping, piping components, and piping elements	Copper alloy >15% Zn	Raw water	Macrofouling/ biofouling and loss of material/ pitting and crevice corrosion, and selective leaching	Chapter XI.M27, "Fire Water System" and Chapter XI.M33, "Selective Leaching of Materials".	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments . Eliminate "Macrofouling/biofouling and" and add "biofouling" after "corrosion."							
A-55	VII.G.6-b VII.G.6-a	Piping, piping components, and piping elements	Stainless steel	Raw water	Loss of material/ pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	Chapter XI.M27, "Fire Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments . Eliminate "macrofouling."							

A-33	VII.G.6-b VII.G.6-a	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general, pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	Chapter XI.M27, "Fire Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments . Eliminate "macrofouling/."							
A-28	VII.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
To be consistent with the original GALL mechanisms for this line, galvanic corrosion should be included.							
A-83	VII.G.7-b	Reactor coolant pump oil collection system Piping, tubing, valve bodies	Steel, copper alloy	Lubricating oil	Loss of material/ general, galvanic, 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
Add "(steel only)" following "general" since copper is not susceptible to general corrosion.							
VII.H1	**Diesel Fuel Oil System**						
A-30	VII.H1.4-a	Piping, piping components, and piping elements	Steel	Fuel oil	Loss of material/ general, pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	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
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "macrofouling/." It is also unclear why biofouling was included in this GALL line in the first place; macro-invertebrates would not exist in fuel oil.							

A-01	VII.H1.1-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," or Chapter XI.M34, "Buried Piping and Tanks Inspection"	No Yes, detection of aging effects and operating experience are to be further evaluated
To be consistent with the original GALL mechanisms for this line, galvanic corrosion should be included.							
VII.H2	**Emergency Diesel Generator System**						
A-30	VII.H2.5-a	Piping, piping components, and piping elements	Steel	Fuel oil	Loss of material/ general, pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	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
Biofouling was not included as an aging mechanism in the original GALL line. See Macrofouling/Biofouling at end of comments. Eliminate "macrofouling/." It is also unclear why biofouling was included in this GALL line in the first place; macro-invertebrates would not exist in fuel oil.							
A-32	VII.H2.1-b	Piping, piping components, and piping elements	Steel	Raw water	Loss of material/ general, pitting, crevice, microbiologically influenced corrosion and macrofouling/ biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Macrofouling – restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "macrofouling/."							

VII.J.	Common Miscellaneous Material Environment Combinations						
Consider deleting “External” designation from environments. Since no aging effects are identified for these combinations, the combination would be equally true for internal surfaces.							
AP-11	AP-11	Piping, piping components, and piping elements	Copper alloy <15% Zn	Air with borated water leakage	None	None	No
Air with borated water leakage implies an external surface which is subject to contamination in some circumstances. The environment is thus potentially aggressive so pitting and crevice corrosion are possible. This line should be deleted.							

Comments on Revised Chapter VIII S&PC Systems Tables

Item	Link	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
VIII.B1.	**Main Steam System (PWR)**						
Modified paragraph in opening text is incomplete.							
S-36	VIII.B1.	Piping, piping components, 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
Line S-36 was added to PWR main steam system and S-38 (below) was added to BWR main steam system. Both address stainless steel which was not in original GALL and is a reasonable addition. However, S-36 addresses loss of material while S-38 is for SCC. Both lines should be in both systems to cover the different effects.							
VIII.B2.	**Main Steam System (BWR)**						
Modified paragraph in opening text is incomplete.							
S-38	VIII.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
Line S-36 (above) was added to PWR main steam system and S-38 was added to BWR main steam system. Both address stainless steel which was not in original GALL and is a reasonable addition. However, S-36 addresses loss of material while S-38 is for SCC. Both lines should be in both systems to cover the different effects.							
VIII.C.	**Extraction Steam System**						
Modified paragraph in opening text is incomplete.							
VIII.D1.	**Feedwater Systems (PWR)**						
Modified paragraph in opening text is incomplete.							

S-10	VIII.D1.2-b VIII.D1.1-c VIII.D1.3-a	Piping, piping components, piping elements, and tanks	Steel	Treated water	Loss of material/ general, pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134 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
Not clear why tanks added to this line. Although possible, tanks are not typically part of a PWR feedwater system and were not included in the linked items in the original GALL.							
SP-17	SP-17	Piping, piping components, and piping elements	Stainless steel	Treated water	Cracking/ stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR secondary water in EPRI TR-102134. 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 augmentation is still being resolved for SP-33	Yes, detection of aging effects is to be evaluated.
For consistency with other cases of cracking in stainless steel, environment should be "Treated water>60°C (>140°F)"							
VIII.D2.	**Feedwater Systems (BWR)**						
Modified paragraph in opening text is incomplete.							

S-35	VIII.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 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
S-35 is a reasonable addition to the feedwater system since stainless steel is a likely material. However, only loss of material was addressed. Another line should be added to address cracking due to SCC for treated water >140°F. Note that this should be addressed as part of the additional MEAP combinations from the second NEI submittal.							
VIII.E.	**Condensate System**						
Modified paragraph in opening text is incomplete.							
SP-8	SP-8	Piping, piping components, and piping elements	Copper alloy <15% Zn	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
This comment applies to all instances of item SP-8. Where this line is used, a second line should be added. The second line should address copper alloy >15% Zn. The aging effect should include selective leaching and the AMP should include XI.M33, "Selective Leaching of Materials." This will be resolved with the inclusion of line SP-29 (See NEI MEAP Final_40_updated 101504 - JRL Comments.doc)							
S-25	VIII.E.4-e	Heat exchanger shell side components	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.E.4-d and –e are complimentary sides of the same condenser, believe this should be tube side. Should consider eliminating "side" designation (i.e., tube side or shell side) throughout this chapter since the side the line refers to doesn't really have any bearing on the aging effect or program, and since, with the wide variety of secondary plant designs, reverse configurations or these heat exchangers may be possible.							
S-26	VIII.E.4-b	Heat exchanger shell side components	Stainless steel	Raw water	Macrofouling and loss of material/ biofouling and pitting, crevice, & microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.E.4-a and –b are complimentary sides of the same condenser, believe this should be tube side. Restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							

S-23	VIII.E.4-e	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
Assuming original GALL lines VIII.E.4-d and –e are complimentary sides of the same condenser, believe this should be tube side.							
S-24	VIII.E.4-b	Heat exchanger shell side components	Steel	Raw water	Macrofouling and loss of material/ biofouling and general, pitting, crevice, & microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.E.4-a and –b are complimentary sides of the same condenser, believe this should be tube side. Restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							
VIII.F.	**Steam Generator Blowdown System (PWR)**						
Modified paragraph in opening text is incomplete.							
S-25	VIII.F.4-e	Heat exchanger shell side components	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.F.4-d and –e are complimentary sides of the same condenser, believe this should be tube side.							
S-26	VIII.F.4-b	Heat exchanger shell side components	Stainless steel	Raw water	Macrofouling and loss of material/ biofouling and pitting, crevice, & microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.F.4-a and –b are complimentary sides of the same condenser, believe this should be tube side. Restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							
S-23	VIII.F.4-e	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
Assuming original GALL lines VIII.F.4-d and –e are complimentary sides of the same condenser, believe this should be tube side.							

S-24	VIII.F.4-b	Heat exchanger shell side components	Steel	Raw water	Macrofouling and loss of material/ biofouling and general, pitting, crevice, & microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.F.4-a and –b are complimentary sides of the same condenser, believe this should be tube side. Restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							
VIII.G.	**Auxiliary Feedwater (AFW) System (PWR)**						
Modified paragraph in opening text is incomplete.							
S-25	VIII.G.5-c	Heat exchanger shell side components	Stainless steel	Closed cycle cooling water	Loss of material/ pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.G.5-c and –d are complimentary sides of the same condenser, believe this should be tube side.							
S-26	VIII.G.5-a	Heat exchanger shell side components	Stainless steel	Raw water	Macrofouling and loss of material/ biofouling and pitting, crevice, & microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.G.5-a and –d are complimentary sides of the same condenser, believe this should be tube side. Restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							
S-23	VIII.G.5-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
Assuming original GALL lines VIII.G.5-c and –d are complimentary sides of the same condenser, believe this should be tube side.							
S-24	VIII.G.5-a	Heat exchanger shell side components	Steel	Raw water	Macrofouling and loss of material/ biofouling and general, pitting, crevice, & microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
Assuming original GALL lines VIII.VIII.G.5-a and –d are complimentary sides of the same condenser, believe this should be tube side. Restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and."							

S-12	VIII.G.1-d	Piping, piping components, and piping elements	Steel	Untreated water	Macrofouling and loss of material/ biofouling and general, pitting, crevice, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
Restoration of biofouling as aging mechanism has made addition of macrofouling unnecessary. See Macrofouling/Biofouling at end of comments. Eliminate "Macrofouling and." Also, although both the original GALL and the NEI submittal used untreated water for this line, the environment should be changed to raw water. Raw water is a much more probable environment than untreated water for this system, and would be consistent with lines S-24, 26, 27 and 28 in this system.							
VIII.I	**Common Miscellaneous Material Environment Combinations**						
Consider deleting "External" designation from environments. Since no aging effects are identified for these combinations, the combination would be equally true for internal surfaces.							

Comments on New Chapter IX Unique Identifiers and Selected Definitions

General:

Entries in the Referring Chapters Columns of the various Chapter IX tables are not always correct. For example, the environment of "air – indoor uncontrolled" in Table C2 lists Chapters II through VIII, but the environment is not used in Chapters V, VI or VIII. The environment of "Treated water >60°C (>140°F)" in Table C1 lists Chapters, V and VII, while the same environment in Table C2 lists Chapters IV, V and VII; neither lists Chapter VIII which references the environment in several lines.

Specific Comments:

<table>
<tr><th colspan="3">Table B2. Selected Descriptions of Materials</th></tr>
<tr><td colspan="2">High-strength low-alloy steel SA 193 Gr. B7</td><td><u>Bolting fabricated from SA193-Gr. B8 austenitic steel, comparable to AISI 304 (UNS# S30400) is also susceptible to stress corrosion cracking</u>.</td></tr>
<tr><td colspan="3">The description does not match the material.</td></tr>
<tr><th colspan="3">Table C2. Selected Descriptions of Environments</th></tr>
<tr><td>III, IV, V, VI, VII, VIII</td><td>Air with borated water leakage</td><td>Air and <u>untreated</u> borated water leakage on indoor or outdoor systems with temperatures above or below the dew point.
Examples of environment descriptors that were specifically referenced in GALL 2001 that comprise this category include:
• Inside PWR containment
• Air, leaking and dripping chemically treated borated water up to 340°C (644°F)
Air, leaking chemically treated borated water</td></tr>
<tr><td colspan="3">Word "untreated" in definition has proven to be somewhat confusing. Suggest adding the following after the first sentence. "Leakage is considered untreated due to the potential for surface contamination."</td></tr>
</table>

V, VII	Condensation (Internal/External)	The environment to which the internal or external surface of the component or structure is exposed Air and condensation with the potential for boric acid leakage on surfaces of indoor systems with temperatures below the dew point – condensation is considered untreated water due to potential for surface contamination Examples of environment descriptors that were specifically referenced in GALL 2001 that comprise this category include: • Saturated air(internal environment as in compressed air)
Underlined portion of definition came from “Condensation with boric acid leakage” in the NEI submittal. Revise to use the words from “Condensation (Int/Ext)” which match this entry.		
VII	Saturated air	This environment is not used. Instead, replaced with condensation.
Saturated air is used as an environment in Chapter VII, line A-103 which treats bolting. Suggest changing environment in Line A-103 to Condensation, and removing the entry in the Referring Chapters column.		

Macrofouling/Biofouling

The use of biofouling as an aging mechanism in the original GALL was not clear to the applicants. It had been interpreted as a mechanism that caused plugging, as a contributor to loss of material, and in some cases, a mechanism that limited heat transfer. The proposed changes submitted by NEI used the terms macrofouling to address the effects of plugging, and fouling to address the loss of heat transfer.

The submittal incorrectly ignored the effect of biofouling on loss of material. As identified by one of the NRC engineering staff members during the review of the submitted material, the aging mechanism of biofouling was meant to address the loss of material that occurs when aquatic animals, such as Asian clams or zebra mussels, attach themselves to equipment surfaces. This aspect of biofouling fits with the convention of listing applicable mechanisms following the aging effect (i.e., the list was typically "Loss of material/….corrosion and biofouling").

Although biofouling can cause plugging, the effect is a reduction of flow. System and component flow requirements are active functional requirements that are properly maintained by system performance testing. These functions are not in the purview of license renewal, so the aspect of plugging should not be considered in the aging management review (this same logic was included in the description of macrofouling in the draft GALL revision).

With the restoration of the aging mechanisms (the NEI submittal proposed eliminating many of them) the term biofouling together with macrofouling has further complicated the issue. A better solution would be to restore the original GALL listing of effects and mechanisms where biofouling was given as a mechanism for loss of material. The term macrofouling should be deleted from these lines. The aging mechanism definitions, currently in Chapter IX, should be used to clearly describe the intent of the biofouling mechanism.

The following changes are proposed for the Chapter IX definitions:

Revise this line as follows (note macrofouling will only appear in Chapter V):

V	Macrofouling	Although plugging of a component affects only flow, an active intended function outside the purview of license renewal, the term macrofouling is used to address plugging as opposed to fouling that causes loss of heat transfer or loss of material. The term applies to plugging of, and includes plugging from any source.

Eliminate the following line:

VII, VIII	Macrofouling and loss of material	Biofouling listed in NUREG-1801 as aging mechanism is assumed to be the plugging of components due to biological growth or material. Although plugging of a component affects only flow, an active intended function outside the purview of license renewal, the term macrofouling is used to address fouling that causes plugging as opposed to fouling that causes loss of heat transfer, and includes plugging from any source, including biological. Macrofouling and loss of material can result from biofouling and general, pitting, crevice,& microbiologically influenced corrosion (MIC)

Revise this line as follows:

V, VII, VIII	Reduction of heat transfer	Reduction of heat transfer from fouling by the buildup (from whatever source) on the heat transfer surface.

Revise this line as follows:

V, VII, VIII	Biofouling	When aquatic animals, such as Asian clams or zebra mussels, attach themselves to equipment

		surfaces, corrosion can be accelerated at the attachment point. This biofouling can cause loss of material. Biofouling can also interfere with heat transfer when the attachment is made on heat transfer surfaces. For the reduction in heat transfer, biofouling is considered part of the general mechanism of buildup of deposits. Although biofouling can also cause plugging of components, the effect is a reduction of flow. System and component flow requirements are active functional requirements that are properly maintained by system performance testing. These functions are not in the purview of license renewal, so the aspect of plugging due to biofouling is not considered in the aging management review.

Copper Alloy

The NEI submittal did not correctly acknowledge the potential for pitting and crevice corrosion of copper alloy with <15% zinc where the environment can contain aggressive chemical species. In areas where repeated wetting can occur, such as condensation on the cooling coils in a HVAC system, airborne contaminates can concentrate. As in the original GALL, the full range of copper alloys, both <15% Zn and >15% Zn, should be included in these lines.

The description of copper alloy <15% Zn, currently in Chapter IX, should be modified as follows:

Copper alloy <15% Zn	Copper, copper nickel, brass, bronze <15% Zn, Aluminum bronze < 8% Al – These materials are resistant to stress corrosion cracking, selective leaching. These materials are also resistant to pitting and crevice corrosion unless subjected to an aggressive chemical environment. May be identified simply as copper alloy when these aging mechanisms are not at issue.

Enclosure 2

Issues Requiring Further Comment after January 2005

1. Additional MEAP combinations may be suggested. They will be based on precedents established in approved SERs for license renewal applications.
2. Although the environments used in GALL 2005 are now more relevant to the evaluation of aging effects, there is still a larger variety of environments than seems necessary. Several environments, especially those representing air, may be combined.
3. The use of the one-time inspection program to confirm effectiveness of chemistry programs has not been consistently applied. A sound basis for the use of this program should be established and used consistently across GALL.
4. Throughout the mechanical sections of GALL, loss of material is not consistently identified as an aging effect for stainless steel in treated water and treated borated water.
5. Aging mechanisms for some material and environment combinations are consistent throughout GALL while the mechanisms for other combinations are not.
6. The description of high strength steel uses a tensile strength threshold that is not consistently applied throughout GALL. Several other material descriptions are used for bolting with no clear consistency in their use.
7. New items addressing bolting have been added to some, but not all systems. Treatment of bolting should have a well defined basis and be handled consistently throughout GALL. Bolting for non-Class 1 mechanical systems should preferably be addressed as part of the external surfaces and bolting tables.
8. External surfaces of non-Class 1 systems are evaluated as part of their respective system and also in the externals surfaces and bolting tables for the Chapter, in some cases redundantly. It is suggested that external surfaces should only be addressed in the external surfaces and bolting tables for those Chapters.
9. Further simplification of some component descriptions may be useful. For example, the designation of “tube side” or “shell side” when describing heat exchanger components may not be necessary. Eliminating these designations could provide more flexibility without changing the validity of the evaluation.

10. In place of a reference to certain aging management programs, such as the reactor vessel internals program, GALL now identifies a number of commitments (e.g., to follow ongoing industry initiatives and to submit inspections programs for NRC review prior to extended period). It is suggested that the GALL tables should identify the applicable aging management programs rather than defining technical aspects of the programs or their implementation.
11. Several new MEAP combinations established for electrical system components have been given aging effects requiring management when existing precedents show that no aging effects require management for these components. This change will result in numerous exceptions to GALL that must be justified and reviewed.
12. Several changes have been made to the aging management program column entries. Comments on these changes will be withheld until issuance of the bases document.
13. The mechanical systems tables include structural components that should be moved to Chapter III, for example new fuel storage racks.
14. Structural tables could be consolidated and simplified with minor restructuring, similar to treatment of structures in SRP Table 3.5-1. Simplification could be achieved by not redundantly listing material in the column for Structure and/or Component.
15. The September 30, 2004 version of GALL on the NRC's website did not include the aging management program descriptions of Chapter XI. Additional comments on the program descriptions are anticipated.