

VII Auxiliary Systems  
A1. New Fuel Storage

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A1.1-a A1.1.1	New fuel rack New fuel rack assembly	Carbon steel	Indoors: exposed to variable temperature and humidity inside the auxiliary building or fuel handling building	Loss of material/ General, pitting, and crevice corrosion	Chapter XI.S6, "Structures Monitoring Program"	No
A-94	Structural Steel	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material	Chapter XI.S6, "Structures Monitoring Program"	No

VII Auxiliary Systems  
A2. Spent Fuel Storage

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A2.1-a A2.1.1	Spent fuel storage racks Neutron-absorbing sheets	Boraflex	Chemically treated oxygenated (BWR) or borated (PWR) water	Reduction of neutron-absorbing capacity/ Boraflex degradation	Chapter XI.M22, "Boraflex Monitoring"	No
A-87	Spent fuel storage racks Neutron-absorbing sheets	Boraflex	Treated water	Reduction of neutron-absorbing capacity	Chapter XI.M22, "Boraflex Monitoring"	No
A-86	Spent fuel storage racks Neutron-absorbing sheets	Boraflex	Treated borated water	Reduction of neutron-absorbing capacity	Chapter XI.M22, "Boraflex Monitoring"	No
A2.1-b A2.1.1	Spent fuel storage racks Neutron-absorbing sheets	Boral, boron steel	Chemically treated oxygenated (BWR) or borated (PWR) water	Reduction of neutron-absorbing capacity and loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-89	Spent fuel storage racks Neutron-absorbing sheets	Boral, boron steel	Treated water	Reduction of neutron-absorbing capacity and loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-88	Spent fuel storage racks Neutron-absorbing sheets	Boral, boron steel	Treated borated water	Reduction of neutron-absorbing capacity and loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A2.1-c A2.1.2	Spent fuel storage racks Storage racks	Stainless steel	Chemically treated oxygenated (BWR) or borated (PWR) water	Crack initiation and growth/ Stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515), or PWR primary water in EPRI TR-105714	No

A-59	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
A-56	General piping and components	Stainless steel	Treated borated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No

VII Auxiliary Systems  
 A3. Spent Fuel Pool Cooling and Cleanup (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A3.1-a A3.1.1	Piping Closure bolting	Carbon steel, low-alloy steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A3.2-a A3.2.1	Filter Housing	Carbon steel with elastomer lining	Chemically treated borated water	Loss of material/ Pitting and crevice corrosion (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-39	General piping and components	Carbon steel with elastomer lining	Treated borated water	Loss of material (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-15	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A3.2-b A3.2.1	Filter Housing (external surface)	Carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

**Comment:** This line does not belong here necessarily (copied from below), but it might make sense to cover the elastomer separately.

**VII Auxiliary Systems**  
**A3. Spent Fuel Pool Cooling and Cleanup (Pressurized Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A3.2-c A3.2.2	Filter Closure bolting	Carbon steel, low-alloy steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A3.2-d A3.2.3	Filter Elastomer lining	Elastomers	Chemically treated borated water	Hardening, cracking/ Elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-15	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A3.3-a A3.3.1	Valves (check and hand valves) Body and bonnet	Carbon steel with elastomer lining	Chemically treated borated water	Loss of material/ Pitting and crevice corrosion (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-39	General piping and components	Carbon steel with elastomer lining	Treated borated water	Loss of material (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-15	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific

**Comment:** This line does not belong here necessarily (copied from above), but it might make sense to cover the elastomer separately.

**VII Auxiliary Systems**  
**A3. Spent Fuel Pool Cooling and Cleanup (Pressurized Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A3.3-b A3.3.1	Valves (check and hand valves) Body and bonnet	Carbon steel with stainless steel cladding	Chemically treated borated water	Crack initiation and growth/ Stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
A-56	General piping and components	Stainless steel	Treated borated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
A3.3-c A3.3.1 A3.3.2	Valves (check and hand valves) Body and bonnet (external surface) Closure bolting	Body: carbon steel; bolting: carbon steel or low-alloy steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A3.3-d A3.3.3	Valves (hand valve only) Elastomer lining	Elastomers	Chemically treated borated water	Hardening, cracking/ Elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-15	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A3.4-a A3.4.1 A3.4.2	Heat exchanger (serviced by closed-cycle cooling water system) Shell and access cover Channel head and access cover	Carbon steel	Shell side: closed-cycle cooling water (treated water)	Loss of material/ General, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

VII Auxiliary Systems  
 A3. Spent Fuel Pool Cooling and Cleanup (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A3.4-b A3.4.1 A3.4.2 A3.4.3	Heat exchanger (serviced by closed-cycle cooling water system) Shell and access cover Channel head and access cover (external surface) Closure bolting	Carbon steel, low-alloy steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A3.5-a A3.5.1 A3.5.2	Ion exchanger (demineralizer) Shell Nozzles	Carbon steel with elastomer lining	Chemically treated borated water	Loss of material/ Pitting and crevice corrosion (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-39	General piping and components	Carbon steel with elastomer lining	Treated borated water	Loss of material (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-15	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A3.5-b A3.5.1 A3.5.2 A3.5.3	Ion exchanger (demineralizer) Shell (external surface) Nozzles (external surface) Closure bolting	Carbon steel, low-alloy steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

**Comment:** This line does not belong here necessarily (copied from above), but it might make sense to cover the elastomer separately.

VII Auxiliary Systems  
 A3. Spent Fuel Pool Cooling and Cleanup (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A3.5-c A3.5.4	Ion exchanger (demineralizer) Elastomer lining	Elastomers	Chemically treated borated water	Hardening, cracking/ Elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-15	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A3.6-a A3.6.1	Pump Closure bolting	Carbon steel, low-alloy steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No



VII Auxiliary Systems  
 A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A4.1-a A4.1.1	Piping Piping, fittings, and flanges	Stainless steel	Chemically treated oxygenated water up to 50°C (125°F)	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
A-58	General piping and components	Stainless steel	Treated water	Loss of material	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
A4.2-a A4.2.1	Filter Housing	Stainless steel; carbon steel with elastomer lining, or stainless steel cladding	Chemically treated oxygenated water up to 50°C (125°F)	Loss of material/ Pitting and crevice corrosion (only for carbon steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

**Comment:** Note that GALL does not include SCC in this lower temperature environment. Also interesting that GALL recognizes loss of material for stainless in oxygenated water but not borated water

VII Auxiliary Systems  
 A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-40	General piping and components	Carbon steel with elastomer lining or stainless steel cladding	Treated water	Loss of material (only for carbon steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-16	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A4.2-b A4.2.2	Filter Elastomer lining	Elastomers	Chemically treated oxygenated water up to 50°C (125°F)	Hardening, cracking/ Elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-16	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A4.3-a A4.3.1	Valves (check and hand valves) Body and bonnet	Stainless steel; carbon steel with elastomer lining, or stainless steel cladding	Chemically treated oxygenated water up to 50°C (125°F)	Loss of material/ Pitting and crevice corrosion (only for carbon steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

Comment: Stainless excluded as independent material since effect only applies to carbon steel. Stainless otherwise covered by previous entry.

Comment: This line does not belong here necessarily (copied from below), but it might make sense to cover the elastomer separately.

Comment: This is assumed to mean that stainless by itself has no aging effects.

VII Auxiliary Systems  
 A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-40	General piping and components	Carbon steel with elastomer lining or stainless steel cladding	Treated water	Loss of material (only for carbon steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-16	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A4.3-b A4.3.2	Valves (hand valve only) Elastomer lining	Elastomers	Chemically treated oxygenated water up to 50°C (125°F)	Hardening, cracking/ Elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-16	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A4.4-a A4.4.1 A4.4.2 A4.4.3	Heat exchanger (serviced by closed-cycle cooling water system) Shell and access cover Channel head and access cover Tubes	Carbon steel	Shell side: closed-cycle cooling water	Loss of material/ General, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

**Comment:** This line does not belong here necessarily (copied from above), but it might make sense to cover the elastomer separately.

**Comment:** The next GALL entry lists only stainless for tubes which seems more reasonable. Will address carbon steel tubes anyway

VII Auxiliary Systems  
 A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A4.4-b A4.4.2 A4.4.3 A4.4.4	Heat exchanger (serviced by closed-cycle cooling water system) Channel head and access cover Tubes Tubesheet	Channel head and access cover: stainless steel, carbon steel with stainless steel cladding; tubes and tubesheet: stainless steel	Demineralized oxygenated water	Loss of material/ General, pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-70	Heat exchanger tube side components including tubes	Stainless steel	Treated water	Loss of material	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
A4.5-a A4.5.1 A4.5.2	Ion exchanger (demineralizer) Shell Nozzles	Stainless steel, carbon steel with elastomer lining	Demineralized oxygenated water	Loss of Material/ Pitting and crevice corrosion (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

**Comment:** Not clear why stainless listed here given qualifier in aging effect

VII Auxiliary Systems  
 A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-40	General piping and components	Carbon steel with elastomer lining or stainless steel cladding	Treated water	Loss of material (only for carbon steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-16	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A4.5-b A4.5.3	Ion exchanger (demineralizer) Elastomer lining	Elastomers	Chemically treated oxygenated water up to 50°C (125°F)	Hardening, cracking/ Elastomer degradation	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-16	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A4.6-a A4.6.1	Pump Casing	Stainless steel, carbon steel (with stainless steel cladding)	Demineralized oxygenated 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

**Comment:** This line does not belong here necessarily (copied from above), but it might make sense to cover the elastomer separately.

VII Auxiliary Systems  
 A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-58	General piping and components	Stainless steel	Treated water	Loss of material	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

**VII Auxiliary Systems**  
**B. Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
B.1-a B.1.1	Cranes including bridge and trolley (for cranes that fall within the scope of 10 CFR 54) Structural girders	Structural steel A-36, A-7, or A-285	Air at 100% relative humidity and 49°C (120°F)	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for structural girders of cranes that fall within the scope of 10 CFR 54. See the Standard Review Plan, Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," for generic guidance for meeting the requirements of 10 CFR 54.21 (c).	Yes, TLAA
A-06	Cranes - Structural girders	Carbon Steel	Air – indoor uncontrolled (Ext)	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for structural girders of cranes that fall within the scope of 10 CFR 54. See the Standard Review Plan, Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," for generic guidance for meeting the requirements of 10 CFR 54.21 (c).	Yes, TLAA
B.1-b B.1.1	Cranes including bridge and trolley (for cranes that fall within the scope of 10 CFR 54) Structural girders	Structural steel A-36, A-7, or A-285	Air at 100% relative humidity and 49°C (120°F)	Loss of material/ General corrosion	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
A-07	Cranes - Structural girders	Carbon Steel	Air – indoor uncontrolled (Ext)	Loss of material	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
B.2-a B.2.1	Rail system Rail	Structural steel A-759	Air at 100% relative humidity and 49°C (120°F)	Loss of material/ Wear	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
A-05	Cranes - rails	Carbon Steel	Air – indoor uncontrolled (Ext)	Loss of material/ wear	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No

VII Auxiliary Systems  
C1. Open-Cycle Cooling Water System (Service Water System)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
C1.1-a C1.1.1	Piping Piping and fittings (with or without internal lining or coating)	Carbon steel (for fresh water only) aluminum-bronze, brass, copper-nickel, stainless steel	Raw, untreated salt water or fresh water	Loss of material/ General (only for carbon steel without lining/coating or with degraded lining/coating), selective leaching (only for aluminum-bronze, brass, and copper-nickel), pitting, crevice, galvanic, microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-38	General piping and components	Carbon steel (without lining/coating or with degraded lining/coating)	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-54	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-44	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-49	General piping and components	Copper alloy >15% Zn	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No

Comment: Not clear what aspect of biofouling was considered here. Have assumed macrofouling



**VII Auxiliary Systems**  
**C1. Open-Cycle Cooling Water System (Service Water System)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
C1.1-b C1.1.2	Piping Underground piping and fittings (external surface, with or without organic coating or wrapping)	Carbon steel	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
A-01	Buried piping and components	Carbon steel (with or without coating or wrapping)	Soil	Loss of material	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
C1.1-c C1.1.2	Piping Underground piping and fittings (external surface, with or without organic coating or wrapping)	Cast iron	Soil	Loss of material/ selective leaching and general corrosion	Chapter XI.M33, "Selective Leaching of Materials"	No
A-02	Buried piping and components	Gray cast iron	Soil	Loss of material/ including selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No

**VII Auxiliary Systems**  
**C1. Open-Cycle Cooling Water System (Service Water System)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
C1.2-a C1.2.1	Valves (check, hand, control, and containment isolation valves) Body and bonnet (with or without internal lining or coating)	Bronze, aluminum-bronze, stainless steel, carbon steel (fresh water only)	Raw, untreated salt water or fresh water	Loss of material/ General (only carbon steel without lining/coating or with degraded lining/coating), selective leaching (only for bronze, aluminum-bronze), pitting, crevice, microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
A-32	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-54	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-44	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-49	General piping and components	Copper alloy >15% Zn	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No

**VII Auxiliary Systems**  
**C1. Open-Cycle Cooling Water System (Service Water System)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
C1.3-a C1.3.1 C1.3.2 C1.3.3 C1.3.4 C1.3.5	Heat exchanger (between open-cycle and closed-cycle cooling water systems) Shell Channel Channel head and access cover Tube sheet Tubes	Shell, channel, channel head and access cover: carbon steel; tube sheet: aluminum-bronze; tubes: copper-nickel, aluminum brass	Shell side: treated water; tube side: raw untreated salt or fresh water	Loss of material/ General (only for carbon steel), selective leaching (only for aluminum-bronze, copper-nickel, and aluminum brass), galvanic, pitting, crevice, microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-64	Heat exchanger tube side components including tubes	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-65	Heat exchanger tube side components including tubes	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-66	Heat exchanger tube side components including tubes	Copper alloy >15% Zn	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
C1.3-b C1.3.5	Heat exchanger (between open-cycle and closed-cycle cooling water systems) Tubes	Copper-nickel, aluminum brass	Shell side: treated water/ tube side: raw untreated salt or fresh water	Buildup of deposit/ Biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-72	Heat exchanger tubes	Copper alloy <15% Zn	Raw water	Reduction of heat transfer	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-74	Heat exchanger tubes	Copper alloy >15% Zn	Raw water	Reduction of heat transfer	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

**Comment:** This GALL item addresses loss of material using open cycle cooling program. Since loss of material on the tube side would be handled by closed cooling water chemistry program, it is apparent that this GALL item does not address the tube side, even though the tube side environment is given for descriptive purposes. Tube side loss of material will be addressed with the tube side system, (closed cycle cooling). This is different from the next GALL item which addresses loss of heat transfer, since the open cycle cooling program is assumed to monitor heat exchanger heat transfer and thus fouling on both sides of the tubes

**VII Auxiliary Systems**  
**C1. Open-Cycle Cooling Water System (Service Water System)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
C1.4-a C1.4.1	Flow orifice Body	Stainless steel	Raw, untreated salt water or fresh water	Loss of material/ Pitting, crevice, microbologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-54	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
C1.5-a C1.5.1	Pump Casing	Cast steel, Carbon steel	Raw, untreated salt water or fresh water	Loss of material/ General, selective leaching (for cast steel), pitting, crevice, microbologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
A-32	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-51	General piping and components	Gray cast iron	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
C1.6-a C1.6.1	Basket strainer Body	Carbon steel, stainless steel	Raw, untreated salt water or fresh water	Loss of material/ General (for carbon steel only), pitting, crevice, microbologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-32	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

VII Auxiliary Systems  
 C1. Open-Cycle Cooling Water System (Service Water System)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-54	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

VII Auxiliary Systems  
C2. Closed-Cycle Cooling Water System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
C2.1-a C2.1.1	Piping Pipe, fittings, and flanges	Carbon steel	35°C (95°F) treated water	Loss of material/ General, pitting, and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
C2.2-a C2.2.1	Valves (check, hand, control, relief, solenoid, and containment isolation valves) Body and bonnet	Carbon steel, stainless steel	35°C (95°F) treated water	Loss of material/ General (only for carbon steel), pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-52	General piping and components	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
C2.3-a C2.3.1	Pump Casing	Carbon steel, cast iron	35°C (95°F) treated water	Loss of material/ General (only for carbon steel), selective leaching (for cast iron only), pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-50	General piping and components	Gray cast iron	Closed cycle cooling water	Loss of material/ including selective leaching	Chapter XI.M21, "Closed-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
C2.4-a C2.4.1	Tank Shell	Carbon steel	35°C (95°F) treated water	Loss of material/ General, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

C2.5-a C2.5.1	Flow orifice Body	Carbon steel	35°C (95°F) treated water	Loss of material/ General, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

**VII Auxiliary Systems  
C3. Ultimate Heat Sink**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
C3.1-a C3.1.1	Piping Piping and fittings (with or without internal lining or coating)	Carbon steel, brass, copper-nickel	Raw, untreated fresh water	Loss of material/ General (only for carbon steel without internal lining or coating), selective leaching (only for brass, copper-nickel), pitting, crevice and microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
A-31	General piping and components	Carbon steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-43	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-48	General piping and components	Copper alloy >15% Zn	Raw water	Loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
C3.2-a C3.2.1	Valves (check, hand, and control) Body and bonnet (with or without internal lining or coating)	Bronze, stainless steel, carbon steel	Raw, untreated fresh water	Loss of material/ General (only for carbon steel), selective leaching (for bronze), pitting, crevice and microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No



A-31	General piping and components	Carbon steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-53	General piping and components	Stainless steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-43	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-48	General piping and components	Copper alloy >15% Zn	Raw water	Loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
C3.3-a C3.3.1	Pump Casing (with or without internal lining or coating)	Carbon steel	Raw, untreated fresh water	Loss of material/ General, pitting, crevice and microbiologically influenced corrosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-31	General piping and components	Carbon steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

**VII Auxiliary Systems**  
**D. Compressed Air System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
D.1-a D.1.1 D.1.2	Piping Piping and fittings Closure bolting	Carbon steel and low-alloy steel	Saturated air	Loss of material/ General and pitting corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No
A-26	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-80	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
D.2-a D.2.1 D.2.2	Valves (including check valves and containment isolation valves) Body and bonnet Closure bolting	Carbon steel	Saturated air	Loss of material/ General and pitting corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No
A-26	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-80	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
D.3-a D.3.1 D.3.2	Air receiver Shell and access cover Closure bolting	Carbon steel	Saturated air	Loss of material/ General and pitting corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No
A-26	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-80	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
D.4-a D.4.1	Pressure regulators Body and bonnet	Carbon steel	Saturated air	Loss of material/ General and pitting corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No
A-26	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-80	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
D.5-a D.5.1 D.5.2	Filter Shell and access cover Closure bolting	Carbon steel	Saturated air	Loss of material/ General and pitting corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No

**Comment:** Closure bolting is listed in most of these entries. It is not clear whether the saturated air environment is supposed to apply to both interior and exterior surfaces. Will assume intent was both surfaces even though condensation (saturated air) is not a major environmental factor in typical air systems.

A-26	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-80	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
D.6-a D.6.1 D.6.2	Dryer Shell and access cover Closure bolting	Carbon steel	Moist air	Loss of material/ General and pitting corrosion	Chapter XI.M24, "Compressed Air Monitoring"	No
A-26	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-80	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No

**VII Auxiliary Systems**  
**E1. Chemical and Volume Control System (Pressurized Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E1.1-a E1.1.1 E1.1.2	High-pressure piping (1500-psig rating) Pipe, fittings, and flanges Closure bolting	Pipe, fittings, and flanges: stainless steel; closure bolting: low-alloy steel, carbon steel	Chemically treated borated water up to 340°C (644°F)	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-57	General piping and components	Stainless steel	Treated borated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-34	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
E1.1-b E1.1.2	High-pressure piping (1500-psig rating) Closure bolting	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of Material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
E1.2-a E1.2.1	Low-pressure piping (150-psig rating) Closure bolting	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

**VII Auxiliary Systems**  
**E1. Chemical and Volume Control System (Pressurized Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
E1.3-a E1.3.1 E1.3.2	High-pressure valves (check, control, hand, motor operated, pressure control, and relief valves) Body and bonnet Closure bolting	Body and bonnet: stainless steel; closure bolting: carbon steel, low-alloy steel	Chemically treated borated water up to 340°C (644°F).	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-57	General piping and components	Stainless steel	Treated borated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-34	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
E1.3-b E1.3.2	High-pressure valves (check, control, hand, motor operated, pressure control, and relief valves) Closure bolting	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

VII Auxiliary Systems  
E1. Chemical and Volume Control System (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E1.4-a E1.4.1	Low-pressure valves (check, control, hand, motor operated, pressure control, and relief valves) Closure bolting	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
E1.5-a E1.5.1 E1.5.2	High-pressure pump Casing Closure bolting	Casing: stainless steel; closure bolting: carbon steel, low-alloy steel	Chemically treated borated water	Crack initiation and growth/ cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-76	High-pressure pump Casing and closure bolting	Stainless steel, carbon steel	Treated borated water	Cracking/cyclic loading	A plant-specific aging management program is to be evaluated.	Yes, plant specific
E1.5-b E1.5.2	High-pressure pump Closure bolting	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
E1.6-a E1.6.1	Low-pressure pump Closure bolting	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

**Comment:** This GALL item is assumed to be looking at cracking in the pump due to cyclic stresses from its operation. Cracking due to SCC is handled elsewhere by water chemistry. Consequently, the pump casing and closure bolting are considered together and should be addressed by a common program.

**VII Auxiliary Systems**  
**E1. Chemical and Volume Control System (Pressurized Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E1.7-a E1.7.1 E1.7.2 E1.7.3 E1.7.4 E1.7.5	Regenerative heat exchanger Channel head (including channel weld) and access cover Tubesheet Tubes Shell and access cover Closure bolting	Stainless steel; closure bolting (low-alloy steel, carbon steel)	Tube and shell side: chemically treated borated water up to 340°C (644°F)	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-57	General piping and components	Stainless steel	Treated borated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-34	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
E1.7-b E1.7.5	Regenerative heat exchanger Closure bolting	Low-alloy steel, carbon steel	Both sides: chemically treated borated water up to 340°C (644°F)	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

**Comment:** Used general rather than specific component name here because fatigue assumed to be common to all high temperature components.

VII Auxiliary Systems  
E1. Chemical and Volume Control System (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E1.7-c E1.7.1 E1.7.2 E1.7.3 E1.7.4	Regenerative heat exchanger Channel head (including channel weld) and access cover Tubesheet Tubes Shell and access cover	Stainless steel	Both sides: chemically treated borated water up to 340°C (644°F)	Crack initiation and growth/ Stress corrosion cracking, cyclic loading	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant specific
A-84	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated borated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant specific
E1.8-a E1.8.1 E1.8.2 E1.8.3 E1.8.4 E1.8.5	Letdown heat exchanger (serviced by closed-cycle cooling water) Channel head (including channel weld) and access cover Tubesheet Tubes Shell and access cover Closure bolting	Stainless steel, carbon steel	Tube side: chemically treated borated water up to 340°C (644°F); shell side: closed-cycle cooling water (treated water)	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA

**Comment:** It is not clear that this would be of any value since the shell side water and tube side water are the same primary water. Neither radioactivity nor temperature monitoring would be very effective without significant leakage (difficult with low pressure differential) and then only with real time monitoring.

**Comment:** It is not clear that this would be of any value since the shell side water and tube side water are the same primary water. Neither radioactivity nor temperature monitoring would be very effective without significant leakage (difficult with low pressure differential) and then only with real time monitoring. Consider deleting this requirement.



**VII Auxiliary Systems**  
**E1. Chemical and Volume Control System (Pressurized Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-57	General piping and components	Stainless steel	Treated borated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-34	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
E1.8-b E1.8.1 E1.8.2 E1.8.3	Letdown heat exchanger (serviced by closed-cycle cooling water) Channel head (including channel weld) and access cover Tubesheet Tubes	Stainless steel	Tube side: chemically treated borated water up to 340°C (644°F); shell side: closed-cycle cooling water	Crack initiation and growth/ Stress corrosion cracking, cyclic loading	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes. (See Oconee operating experience, License Renewal Application, Revision 2, June 1998, p. 3.4-26)	Yes, plant specific

VII Auxiliary Systems  
E1. Chemical and Volume Control System (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-69	Heat exchanger tube side components including tubes	Stainless steel	Treated borated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes. (See Oconee operating experience, License Renewal Application, Revision 2, June 1998, p. 3.4-26)	Yes, plant specific
E1.8-c	Letdown heat exchanger (serviced by closed-cycle cooling water)	Carbon steel	Closed-cycle cooling water	Loss of material/ Pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
E1.8.4	Shell and access cover					
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
E1.8-d	Letdown heat exchanger (serviced by closed-cycle cooling water)	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
E1.8.5	Closure bolting					
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
E1.9-a	Basket strainer	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
E1.9.1	Closure bolting					
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

**Comment:** Based on material and aging effect of GALL item, this is the only line needed. Plant AMR would also typically consider stainless tubes in treated water for LOM. No fouling since cooling not an IF here.

VII Auxiliary Systems  
 E1. Chemical and Volume Control System (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E1.10-a E1.10.1	Volume control tank Closure bolting	Low-alloy steel, carbon steel	Air, leaking chemically treated borated water	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No

VII Auxiliary Systems  
E2. Standby Liquid Control System (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E2.1-a E2.1.1	Piping Piping and fittings in contact with sodium pentaborate solution	Stainless steel	Sodium pentaborate solution at 21 - 32 °C (70 - 90°F) (≈24,500 ppm B)	Crack initiation and growth/ Stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
A-59	General piping and components	Stainless steel	Treated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
E2.2-a E2.2.1 E2.2.2	Solution storage Tank Tank heaters	Stainless steel	Sodium pentaborate solution at 21 - 32 °C (70 - 90°F) (≈24,500 ppm B)	Crack initiation and growth/ Stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
A-59	General piping and components	Stainless steel	Treated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
E2.3-a E2.3.1	Valves (pump suction, relief, injection, containment isolation, and explosive actuated discharge valves) Body and bonnet	Stainless steel	Sodium pentaborate solution at 21 - 32 °C (70 - 90°F) (≈24,500 ppm B)	Crack initiation and growth/ Stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
A-59	General piping and components	Stainless steel	Treated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
E2.4-a E2.4.1	Injection pumps Casing	Stainless steel	Sodium pentaborate solution at 21 - 32 °C (70 - 90°F) (≈24,500 ppm B)	Crack initiation and growth/ Stress corrosion cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No

**Comment:** According to EPRI mechanical tools, sodium pentaborate solution is relatively benign for stainless. Assumed to be basic treated water.

A-59	General piping and components	Stainless steel	Treated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
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**VII Auxiliary Systems**  
**E3. Reactor Water Cleanup System (Boiling Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E3.1-a E3.1.1	Piping Piping and fittings (beyond second isolation valve)	Stainless steel: types 304, 316, or 316NG	Oxygenated water 93°C -288°C (200°F-550°F)	Crack initiation and growth/ Stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No
A-60	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No
E3.1-b E3.1.1	Piping Piping and fittings (beyond second isolation valve)	Stainless steel: types 304, 316, or 316NG	Oxygenated water 93°C -288°C (200°F-550°F)	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-62	General piping and components	Stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
E3.2-a E3.2.1	Reactor water cleanup (RWCU) pump Casing	Cast austenitic stainless steel	Oxygenated water 93°C -288°C (200°F-550°F)	Crack initiation and growth/ Stress corrosion cracking, intergranular stress corrosion cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No
A-41	General piping and components	Cast austenitic stainless steel	Treated water > 140°F	Cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No

**VII Auxiliary Systems**  
**E3. Reactor Water Cleanup System (Boiling Water Reactor)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E3.2-b E3.2.1	RWCU pump Casing	Cast austenitic stainless steel, stainless steel	Oxygenated water 93°C -288°C (200°F-550°F)	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-62	General piping and components	Stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-42	General piping and components	Cast austenitic stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
E3.2-c E3.2.2	RWCU pump Closure bolting	High strength low-alloy steel	Air, Leaking oxygenated water	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-34	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA

VII Auxiliary Systems  
E3. Reactor Water Cleanup System (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E3.3-d E3.3.1 E3.3.2 E3.3.3 E3.3.4	Regenerative heat exchanger Channel head and access cover Tubesheet Tubes Shell and access cover	Channel head and access cover, tubesheet, tubes: stainless steel; Shell and access cover: high strength low-alloy steel with stainless steel cladding	Oxygenated water at 288°C (550°F) and 10 MPa max.	Crack initiation and growth/ Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-85	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
E3.4-a E3.4.1 E3.4.2 E3.4.3 E3.4.4	Non-regenerative heat exchanger (serviced by closed-cycle cooling water) Channel head and access cover Tubesheet Tubes Shell and access cover	Channel head and access cover, tubesheet, tubes: stainless steel; Shell and access cover: high strength low-alloy steel with stainless steel cladding	Reactor coolant water at 288°C (550°F) and 10 MPa max.	Crack initiation and growth/ Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-68	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-71	Heat exchanger tube side components including tubes	Stainless steel	Treated water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**Comment:** Environment added to be consistent with NUREG component description even though not included in environment column



VII Auxiliary Systems  
 E3. Reactor Water Cleanup System (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E3.4-b E3.4.4	Non-regenerative heat exchanger (serviced by closed-cycle cooling water) Shell and access cover	High strength low-alloy steel with stainless steel cladding	Reactor coolant water at 10 MPa max.	Loss of material/ Microbiologically influenced corrosion (for portions of the RWCU system <93°C [200°F])	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-67	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

**Comment:** This is CCCW rather than RCS water as stated in GALL

VII Auxiliary Systems  
E4. Shutdown Cooling System (Older Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
E4.1-a E4.1.1	Piping Piping and fittings	Carbon steel, stainless steel	Oxygenated water, up to 288°C (550°F)	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
A-35	General piping and components	Carbon steel	Treated water	Loss of material	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
A-58	General piping and components	Stainless steel	Treated water	Loss of material	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
E4.1-b E4.1.1	Piping Piping and fittings	Carbon steel, stainless steel	Oxygenated water, up to 288°C (550°F)	Cumulative fatigue damage/ Fatigue	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes TLAA

VII Auxiliary Systems  
E4. Shutdown Cooling System (Older Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-37	General piping and components	Carbon steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-62	General piping and components	Stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
E4.1-c E4.1.1	Piping Piping and fittings	Stainless steel	Oxygenated water, up to 288°C (550°F)	Crack initiation and growth/ 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
A-61	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking" and Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
E4.2-a E4.2.1	Pump Casing	Carbon steel	Oxygenated water, up to 288°C (550°F)	Loss of material/ Pitting and crevice corrosion	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

VII Auxiliary Systems  
E4. Shutdown Cooling System (Older Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-35	General piping and components	Carbon steel	Treated water	Loss of material	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
E4.3-a E4.3.1	Valves (check, control, hand, motor operated, and relief valves) Body and bonnet	Stainless steel forging, stainless steel casting	Oxygenated water, up to 288°C (550°F)	Crack initiation and growth/ 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
A-61	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking" and Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
E4.4-a E4.4.1 E4.4.2 E4.4.3 E4.4.4	Heat exchanger (serviced by closed-cycle cooling water system) Channel head and access cover Tubesheet Tubes Shell and access cover	Channel head and access cover: carbon steel; tubesheet: carbon steel (stainless steel cladding on channel side; Tubes: stainless steel; Shell: carbon steel	Reactor coolant water, and closed-cycle cooling water	Loss of material/ Pitting, crevice and microbiologically influenced corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-67	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

**Comment:** LOM of tube side components not covered by CCCW. Would be covered by other entries above

**VII Auxiliary Systems**  
**F1. Control Room Area Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F1.1-a F1.1.1 F1.1.2	Duct Duct fittings, access doors, and closure bolts Equipment frames and housing	Carbon steel (galvanized or painted) bolts: plated carbon steel	Warm, moist air	Loss of material/ General, pitting, crevice corrosion, and microbiologically influenced corrosion (for duct [drip-pan] and piping for moisture drainage)	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
F1. Control Room Area Ventilation System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F1.1-b F1.1.3 F1.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Hardening and loss of strength/ Elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F1.1-c F1.1.3 F1.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F1.2-a F1.2.1	Air handler heating/ cooling Heating/ cooling coils	Copper/ nickel	Warm, moist air	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F1.3-a F1.3.1	Piping Piping and fittings	Carbon steel	Hot or cold treated water	Loss of material/ General, pitting, crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

Comment: Temperature threshold applied to internal environment which is not assumed to be exposed to ultraviolet radiation.

VII Auxiliary Systems  
F1. Control Room Area Ventilation System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F1.4-a F1.4.1	Filters Housing and supports	Carbon steel, stainless steel	Warm, moist air	Loss of material/ General (only for carbon steel), pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-11	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-12	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Int)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-09	Ducting, piping and components external surfaces	Stainless steel	Condensation (Ext)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F1.4-b F1.4.2	Filters Elastomer seals	Elastomers (Neoprene and similar materials)	Warm, moist air	Hardening and loss of strength/ Elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**Comment:** Condensation used since stainless would require frequent wetting to be susceptible to pitting and crevice corrosion

**VII Auxiliary Systems**  
**F2. Auxiliary and Radwaste Area Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F2.1-a F2.1.1 F2.1.2	Duct Duct fittings, access doors, and closure bolts Equipment frames and housing	Carbon steel (galvanized or painted) bolts: plated carbon steel	Warm, moist air	Loss of material/ General, pitting, crevice corrosion, and microbiologically influenced corrosion (for duct [drip-pan] and piping for moisture drainage)	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific



**VII Auxiliary Systems**  
**F2. Auxiliary and Radwaste Area Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F2.1-b F2.1.3 F2.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Hardening and loss of strength/ Elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F2.1-c F2.1.3 F2.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F2.2-a F2.2.1	Air handler heating/ cooling Heating/ cooling coils	Copper/ nickel	Warm, moist air	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F2.3-a F2.3.1	Piping Piping and fittings	Carbon steel	Hot or cold treated water	Loss of material/ General, pitting, crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

**Comment:** Temperature threshold applied to internal environment which is not assumed to be exposed to ultraviolet radiation.

**VII Auxiliary Systems**  
**F2. Auxiliary and Radwaste Area Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F2.4-a F2.4.1	Filters Housing and supports	Carbon steel, stainless steel	Warm, moist air	Loss of material/ General (only for carbon steel), pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-11	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-12	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Int)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-09	Ducting, piping and components external surfaces	Stainless steel	Condensation (Ext)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F2.4-b F2.4.2	Filters Elastomer seals	Elastomers (Neoprene and similar materials)	Warm, moist air	Hardening and loss of strength/ Elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems**  
**F3. Primary Containment Heating and Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F3.1-a F3.1.1 F3.1.2	Duct Duct fittings, access doors and closure bolts Equipment frames and housing	Carbon steel (galvanized or painted) bolts: plated carbon steel	Warm, moist air	Loss of material/ General, pitting, crevice corrosion, and microbiologically influenced corrosion (for duct [drip-pan] and piping for moisture drainage)	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
F3. Primary Containment Heating and Ventilation System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F3.1-b F3.1.3 F3.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Hardening and loss of strength/ Elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F3.1-c F3.1.3 F3.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F3.2-a F3.2.1	Air handler heating/ cooling Heating/ cooling coils	Copper/nickel	Warm, moist air	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F3.3-a F3.3.1	Piping Piping and fittings	Carbon steel	Hot or cold treated water	Loss of material/ General, pitting, crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

Comment: Temperature threshold applied to internal environment which is not assumed to be exposed to ultraviolet radiation.

VII Auxiliary Systems  
F3. Primary Containment Heating and Ventilation System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F3.4-a F3.4.1	Filters Housing and supports	Carbon steel, stainless steel	Warm, moist air	Loss of material/ General (only for carbon steel), pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-11	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-12	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Int)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-09	Ducting, piping and components external surfaces	Stainless steel	Condensation (Ext)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F3.4-b F3.4.2	Filters Elastomer seals	Elastomers (Neoprene and similar materials)	Warm, moist air	Hardening and loss of strength/ Elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems**  
**F4. Diesel Generator Building Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F4.1-a F4.1.1 F4.1.2	Duct Duct fittings, access doors, and closure bolts Equipment frames and housing	Carbon steel (galvanized or painted); Bolts: plated carbon steel	Warm, moist air	Loss of material/ General, pitting, crevice corrosion, and microbiologically influenced corrosion (for duct [drip-pan] and piping for moisture drainage)	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems**  
**F4. Diesel Generator Building Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
F4.1-b F4.1.3 F4.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Hardening and loss of strength/ Elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F4.1-c F4.1.3 F4.1.4	Duct Flexible collars between ducts and fans Seals in dampers and doors	Elastomer (Neoprene)	Warm, moist air	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F4.2-a F4.2.1	Air handler heating/cooling Heating/cooling coils	Copper/nickel	Warm, moist air	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
F4.3-a F4.3.1	Piping Piping and fittings	Carbon steel	Hot or cold treated water	Loss of material/ General, pitting and crevice corrosion	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

**VII Auxiliary Systems**  
**G. Fire Protection**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
G.1-a G.1.1	Intake structure Fire barrier penetration seals (for piping, electrical conduit, cable tray, heating, ventilation, air condition, and expansion joint)	Sealant	Indoors: air; outdoors: sun, weather, humidity, and moisture	Increased hardness and shrinkage/ Weathering	Chapter XI.M26, "Fire Protection"	No
A-19	Fire barrier penetration seals	Elastomer	Air – indoor uncontrolled	Change in material properties	Chapter XI.M26, "Fire Protection"	No
A-20	Fire barrier penetration seals	Elastomer	Air – outdoor	Change in material properties	Chapter XI.M26, "Fire Protection"	No
G.1-b G.1.2	Intake structure Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Concrete cracking and spalling/ Freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
A-90	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
A-92	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
G.1-c G.1.2	Intake structure Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
A-91	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No



**VII Auxiliary Systems**  
**G. Fire Protection**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-93	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
G.1-d G.1.3	Intake structure Fire rated doors	Steel	Indoor and outdoor environments	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
A-21	Fire doors	Carbon steel	Air – indoor uncontrolled	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
A-22	Fire doors	Carbon steel	Air – outdoor	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
G.2-a G.2.1	Turbine building Fire barrier penetration seals (for piping, electrical conduit, cable tray, heating, ventilation, air condition, and expansion joint)	Sealant	Indoors: air; outdoors: sun, weather, humidity, and moisture	Increased hardness and shrinkage/ Weathering	Chapter XI.M26, “Fire Protection”	No
A-19	Fire barrier penetration seals	Elastomer	Air – indoor uncontrolled	Change in material properties	Chapter XI.M26, “Fire Protection”	No
A-20	Fire barrier penetration seals	Elastomer	Air – outdoor	Change in material properties	Chapter XI.M26, “Fire Protection”	No
G.2-b G.2.2	Turbine building Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Concrete cracking and spalling/ Freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-90	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No

**VII Auxiliary Systems**  
**G. Fire Protection**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-92	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
G.2-c G.2.2	Turbine building Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-91	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-93	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
G.2-d G.2.3	Turbine building Fire rated doors	Steel	Indoor and outdoor environments	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
A-21	Fire doors	Carbon steel	Air – indoor uncontrolled	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
A-22	Fire doors	Carbon steel	Air – outdoor	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
G.3-a G.3.1	Auxiliary building Fire barrier penetration seals (for piping, electrical conduit, cable tray, heating, ventilation, air condition, and expansion joint)	Sealant	Indoors: air; outdoors: sun, weather, humidity, and moisture	Increased hardness and shrinkage/ Weathering	Chapter XI.M26, “Fire Protection”	No
A-19	Fire barrier penetration seals	Elastomer	Air – indoor uncontrolled	Change in material properties	Chapter XI.M26, “Fire Protection”	No
A-20	Fire barrier penetration seals	Elastomer	Air – outdoor	Change in material properties	Chapter XI.M26, “Fire Protection”	No

**VII Auxiliary Systems**  
**G. Fire Protection**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
G.3-b G.3.2	Auxiliary building Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Concrete cracking and spalling/ Freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring Program"	No
A-90	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
A-92	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
G.3-c G.3.2	Auxiliary building Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring Program"	No
A-91	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
A-93	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
G.3-d G.3.3	Auxiliary building Fire rated doors	Steel	Indoor and outdoor environments	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
A-21	Fire doors	Carbon steel	Air – indoor uncontrolled	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
A-22	Fire doors	Carbon steel	Air – outdoor	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No

**VII Auxiliary Systems  
G. Fire Protection**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
G.4-a G.4.1	Diesel generator building Fire barrier penetration seals (for piping, electrical conduit, cable tray, heating, ventilation, air condition, and expansion joint)	Sealant	Indoors: air; outdoors: sun, weather, humidity, and moisture	Increased hardness and shrinkage/ Weathering	Chapter XI.M26, "Fire Protection"	No
A-19	Fire barrier penetration seals	Elastomer	Air – indoor uncontrolled	Change in material properties	Chapter XI.M26, "Fire Protection"	No
A-20	Fire barrier penetration seals	Elastomer	Air – outdoor	Change in material properties	Chapter XI.M26, "Fire Protection"	No
G.4-b G.4.2	Diesel generator building Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Concrete cracking and spalling/ Freeze-thaw, aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring Program"	No
A-90	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
A-92	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
G.4-c G.4.2	Diesel generator building Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor and outdoor environments	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring Program"	No
A-91	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
A-93	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No

**VII Auxiliary Systems**  
**G. Fire Protection**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
G.4-d G.4.3	Diesel generator building Fire rated doors	Steel	Indoor and outdoor environments	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
A-21	Fire doors	Carbon steel	Air – indoor uncontrolled	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
A-22	Fire doors	Carbon steel	Air – outdoor	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
G.5-a G.5.1	Primary containment Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor	Concrete cracking and spalling/ Aggressive chemical attack, and reaction with aggregates	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring Program"	No
A-90	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
G.5-b G.5.1	Primary containment Fire barrier walls, ceilings, and floors	Concrete and reinforcement	Indoor	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection," and Chapter XI.S6, "Structures Monitoring Program"	No
A-91	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, "Fire Protection" and Chapter XI.S6, "Structures Monitoring Program"	No
G.5-c G.5.2	Primary containment Fire rated doors	Steel	Indoor	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
A-21	Fire doors	Carbon steel	Air – indoor uncontrolled	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
G.6-a G.6.1	Water-based fire protection system Piping and fittings	Carbon steel, cast iron, and stainless steel	Raw water	Loss of material/ General, galvanic, pitting, crevice, microbiologically influenced corrosion and biofouling	Chapter XI.M27, "Fire Water System"	No
A-33	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No

VII Auxiliary Systems  
G. Fire Protection

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-55	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
G.6-b G.6.2	Water-based fire protection system Filter, fire hydrant, mulsifier, pump casing, sprinkler, strainer, and valve bodies (including containment isolation valves)	Carbon steel, cast iron, bronze, copper, stainless steel	Raw water	Loss of material/ General, galvanic, pitting, crevice, microbiologically influenced corrosion and biofouling	Chapter XI.M27, "Fire Water System"	No
A-33	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-55	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-47	General piping and components	Copper alloy >15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-45	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
G.7-a G.7.1	Reactor coolant pump oil collection system Tank	Carbon steel	Lubricating oil (with contaminants and/or moisture)	Loss of material/ General, galvanic, pitting and crevice corrosion	A plant specific aging management program that determines the thickness of the lower portion of the tank is to be evaluated. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-82	Reactor coolant pump oil collection system Tank	Carbon steel	Lubricating oil	Loss of material	A plant specific aging management program that determines the thickness of the lower portion of the tank is to be evaluated. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

VII Auxiliary Systems  
G. Fire Protection

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
G.7-b G.7.2	Reactor coolant pump oil collection system Piping, tubing, valve bodies	Piping and valve bodies: carbon steel; tubing: copper, brass	Lubricating oil (with contaminants and/or moisture)	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
A-83	Reactor coolant pump oil collection system Piping, tubing, valve bodies	Carbon steel, copper alloy	Lubricating oil	Loss of material	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
G.8-a G.8.1	Diesel fire system Diesel-driven fire pump (pump casing) and fuel oil supply line	Carbon steel	Fuel oil	Loss of material/ General, galvanic, pitting and crevice corrosion	Chapter XI.M26, "Fire Protection," and Chapter XI.M30, "Fuel Oil Chemistry"	No
A-28	General piping and components	Carbon steel	Fuel oil	Loss of material	Chapter XI.M26, "Fire Protection," and Chapter XI.M30, "Fuel Oil Chemistry"	No

**VII Auxiliary Systems**  
**H1. Diesel Fuel Oil System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
H1.1-a H1.1.1	Piping Aboveground piping and fittings	Carbon steel	Outdoor ambient conditions	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-24	General piping and components	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
H1.1-b H1.1.2	Piping Underground piping and fittings	Carbon steel	Soil and groundwater	Loss of material/ General, galvanic, 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
A-01	Buried piping and components	Carbon steel (with or without coating or wrapping)	Soil	Loss of material	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
H1.2-a H1.2.1 H1.2.2	Valves Body and bonnet Closure bolting	Carbon steel or low-alloy steel	Outdoor ambient conditions	Loss of material/ General, pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific



VII Auxiliary Systems  
H1. Diesel Fuel Oil System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-24	General piping and components	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
H1.3-a H1.3.1 H1.3.2	Pump Casing Closure bolting	Carbon steel or low-alloy steel	Outdoor ambient conditions	Loss of material/ General, pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-24	General piping and components	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
H1.4-a H1.4.1	Tank Internal surface	Carbon steel	Fuel oil, water (as contaminant)	Loss of material/ General, pitting, crevice, microbologically influenced corrosion and 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
A-30	General piping and components	Carbon steel	Fuel oil	Loss of material	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
H1.4-b H1.4.2	Tank External surface	Carbon steel	Outdoor ambient conditions	Loss of material/ General, pitting and crevice corrosion	Chapter XI.M29, “Aboveground Carbon Steel Tanks”	No
A-95	Tank	Carbon steel	Air – outdoor (Ext)	Loss of material	Chapter XI.M29, “Aboveground Carbon Steel Tanks”	No

VII Auxiliary Systems  
H2. Emergency Diesel Generator System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
H2.1-a H2.1.1	Diesel engine cooling water subsystem (serviced by closed-cycle cooling water system) Piping and fittings	Carbon steel	Chemically treated demineralized water <90°C (194°F)	Loss of Material/ General, pitting and crevice corrosion	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of Material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
H2.1-b H2.1.1	Diesel engine cooling water subsystem (serviced by open-cycle cooling water system) Piping and fittings	Carbon steel	Raw, untreated salt water or fresh water	Loss of Material/ General, pitting, crevice, microbiologically influenced corrosion and biofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-32	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
H2.2-a H2.2.1 H2.2.2 H2.2.3 H2.2.4	Diesel engine starting air subsystem Piping and fittings Valves (hand and check) Drain trap Air accumulator vessel	Carbon steel	Moist air	Loss of material/ General, pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-23	General piping and components	Carbon steel	Air – indoor uncontrolled (Int or Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
H2.3-a H2.3.1 H2.3.2 H2.3.3	Diesel engine combustion air intake subsystem Piping and fittings Filter Muffler	Carbon steel	Moist air	Loss of material/ General, pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-23	General piping and components	Carbon steel	Air – indoor uncontrolled (Int or Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
H2. Emergency Diesel Generator System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
H2.4-a H2.4.1 H2.4.2	Diesel engine combustion air exhaust subsystem Piping and fittings Muffler	Carbon steel	Hot diesel engine exhaust gases containing moisture and particulates	Loss of material/ General, pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-27	General piping and components	Carbon steel	Exhaust gases	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
H2.5-a H2.5.1	Diesel engine fuel oil subsystem Tanks (day and drip)	Carbon steel	Diesel fuel oil	Loss of Material/ General, pitting, crevice and microbiologically influenced corrosion	Chapter XI.M30, "Fuel Oil Chemistry"  The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-29	General piping and components	Carbon steel	Fuel oil	Loss of material	Chapter XI.M30, "Fuel Oil Chemistry"  The AMP is to be augmented by verifying the effectiveness of fuel oil chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

**VII Auxiliary Systems**  
**I. Carbon Steel Components**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
I.1-a I.1.1	Carbon steel components (PWRs) External surfaces	Carbon steel, low-alloy steel	Air, leaking and dripping chemically treated borated water up to 340°C (644°F)	Loss of material/ Boric acid corrosion of external surfaces	Chapter XI.M10, "Boric Acid Corrosion"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
I.1-b I.1.1	Carbon steel components (PWRs and BWRs) External surfaces	Carbon steel, low-alloy steel	Air, moisture, and humidity < 100°C (212°F)	Loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-77	Piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-81	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-78	Piping and components external surfaces and bolting	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
I.2-a I.2.1	Closure bolting In high-pressure or high-temperature systems	Carbon steel, low-alloy steel	Air, moisture, humidity, and leaking fluid	Loss of material/ General corrosion	Chapter XI.M18, "Bolting Integrity"	No
A-03	Closure bolting In high-pressure or high-temperature systems	Carbon steel	Air with steam or water leakage	Loss of material	Chapter XI.M18, "Bolting Integrity"	No

I.2-b I.2.1	Closure bolting In high-pressure or high-temperature systems	Carbon steel, low-alloy steel	Air, moisture, humidity, and leaking fluid	Crack initiation and growth/ Cyclic loading, stress corrosion cracking	Chapter XI.M18, "Bolting Integrity"	No
A-04	Closure bolting In high-pressure or high-temperature systems	Carbon steel	Air with steam or water leakage	Cracking	Chapter XI.M18, "Bolting Integrity"	No

**General Material Types**

<u>Material</u>	<u>Description</u>
Aluminum	Pure aluminum
Aluminum alloys	Alloys of aluminum
Carbon steel	For a given environment, carbon steel, alloy steel, and cast iron exhibit the same aging effects, even though the rates of aging may vary. Consequently, these metal types may be considered the same for aging management reviews. Gray cast iron is also susceptible to selective leaching and high strength low alloy steel is also susceptible to stress corrosion cracking. Therefore, when these aging effects are being considered, these materials are specifically mentioned; otherwise they are considered part of the general category of carbon steel. (References 5, 6)
Cast austenitic stainless steel	Cast stainless steels containing ferrite in an austenitic matrix
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 and pitting and crevice corrosion. (References 5, 6) May be identified simply as copper alloy when these aging mechanisms are not at issue.
Copper alloy >15% Zn	Copper, brass and other alloys >15% Zn, Aluminum bronze > 8% Al – These materials are susceptible to stress corrosion cracking, selective leaching (except for inhibited brass) and pitting and crevice corrosion. (References 5, 6) May be identified simply as copper alloy when these aging mechanisms are not at issue.
Elastomers	Elastomers include rubber, EPT, EPDM, PTFE, ETFE, viton, vitril, neoprene, silicone elastomer, etc.
Galvanized steel	Zinc coated carbon steel
Glass	All glass materials
Soils	Earthen structures
Nickel-alloy	Nickel based iron alloys such as Alloy 600, Alloy 690, Inconel
Reinforced concrete	Concrete with embedded steel reinforcement

Stainless steel

Wrought or forged austenitic stainless steel

**Environment Categories**

<u>Environment</u> <sup>1</sup>	<u>Description</u>
Air – indoor controlled (Int/Ext)	Indoor air in a humidity controlled (e.g., air conditioned) environment.
Air – indoor uncontrolled (Int/Ext)	Indoor air on systems with temperatures higher than the dew point – Condensation can occur but only rarely – equipment surfaces are normally dry.
Air – indoor uncontrolled > 95°F (Int/Ext)	Indoor air above thermal stress threshold for elastomers
Air with boric acid leakage	Air and untreated borated water leakage on indoor or outdoor systems with temperatures above or below the dew point
Air with reactor coolant leakage	Air and reactor coolant or steam leakage on high temperature systems
Air with steam or water leakage	Air and untreated steam or water leakage on indoor or outdoor systems with temperatures above or below the dew point
Air – outdoor (Int/Ext)	Exposed to air and local weather conditions including salt spray where applicable
Air and steam	Exposed normally to air and periodically to steam
Condensation (Int/Ext)	Air and condensation on surfaces of indoor systems with temperatures below the dew point – for exterior surfaces and interior surfaces in communication ambient indoor air, condensation is considered untreated water due to potential for surface contamination.
Condensation with boric acid leakage	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

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<sup>1</sup> For environments listed with (Int/Ext), the component information description should identify whether the surface is internal or external. This information is important because it indicates the applicability of direct visual observation of the surface for aging management. For the remaining environments, this distinction need not be made since the environment must be internal to some barrier that precludes direct observation of the surface.



Closed cycle cooling water	Treated water subject to the closed cycle cooling water chemistry program
Concrete	Components embedded in concrete
Dried Air	Air that has been treated to reduce the dew point well below the system operating temperature
Exhaust gases	Gas present in a diesel engine exhaust
Gas	Inert gases such as carbon dioxide, freon, halon, nitrogen
Fuel oil	Fuel oil used for combustion engines
Lubricating oil	Lubricating oil for plant equipment with possible water contamination
Neutron flux	Reactor core environment for ferritic materials that will result in a neutron fluence exceeding $10^{17}$ n/cm <sup>2</sup> (E >1 MeV) at the end of the license renewal term.
Raw water	Raw untreated fresh or salt water
Reactor coolant	Water in the reactor coolant system and connected systems at or near full operating temperature – includes steam for BWRs
Reactor coolant > 482°F	Water in the reactor coolant system and connected systems above thermal embrittlement threshold for CASS
Sand and concrete	Sand/concrete base for tanks
Soil	External environment for components buried in the soil, including groundwater in the soil
Secondary feedwater/steam	PWR feedwater or steam at or near full operating temperature subject to the secondary water chemistry program
Steam	Steam, subject to BWR water chemistry program or PWR secondary plant water chemistry program
Treated borated water	Treated water with boric acid

Treated borated water >140°F	Treated water with boric acid above SCC threshold for stainless steel
Treated borated water >482°F	Treated water with boric acid above thermal embrittlement threshold for CASS
Treated water	Treated or demineralized water – This environment is used where the context of the MEAP combination makes the type of treated water apparent; e.g., if the program is for PWR secondary water chemistry, the treated water is from the PWR secondary system.
Treated water >140°F	Treated water above SCC threshold for stainless steel
Treated water >482°F	Treated water above thermal embrittlement threshold for CASS
Untreated water	Water that may contain contaminants including oil and boric acid depending on the location – includes originally treated water that is not monitored by a chemistry program

**Temperature Thresholds**

<u>Temperature</u>	<u>Threshold</u>	<u>Basis</u>
95°F	Thermal stresses for elastomers	In general, if the ambient temperature is less than about 95°F, then thermal aging may be considered not significant for rubber, butyl rubber, neoprene, nitrile rubber, silicone elastomer, fluoroelastomer, EPR, and EPDM (Reference 8).
140°F	SCC for stainless steel	In general, SCC very rarely occurs in austenitic stainless steels below 140°F (Reference 1, 2). Although SCC has been observed in stagnant, oxygenated borated water systems at lower temperatures than this 140°F threshold, all of these instances have identified a significant presence of contaminants (halogens, specifically chlorides) in the failed components. With a harsh enough environment (significant contamination), SCC can occur in austenitic stainless steel at ambient temperature. However, these conditions are considered event driven, resulting from a breakdown of chemistry controls. Further discussion of this threshold is provided in Reference 7.
482°F	Thermal embrittlement for CASS	CASS materials subjected to sustained temperatures below 250°C (482°F) will not result in a reduction of room temperature Charpy impact energy below 50 ft-lb for exposure times of approximately 300,000 hours (for CASS with ferrite content of 40%) and approximately 2,500,000 hours for CASS with ferrite content of 14%) [Figure 1; Reference 4]. For a maximum exposure time of approximately 420,000 hours (48 EFPY), a screening temperature of 482°F is conservatively chosen because (1) the majority of nuclear grade materials are expected to contain a ferrite content well below 40%, and (2) the 50 ft-lb limit is very conservative when applied to cast austenitic materials. It is typically applied to ferritic materials (e.g., 10 CFR 50 Appendix G). For CASS components in the reactor coolant pressure boundary, this threshold is supported by NUREG-1801 XI.M12, with the exception of niobium-containing steels which require evaluation on a case-by-case basis.

**New Aging Effect Terms**

Change in material properties

This effect covers all degradation of a material's properties considered important for its intended function

Reduction of heat transfer

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

Macrofouling

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.

**References**

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2. Metals Handbook, Ninth Edition, Volume 13, Corrosion, American Society of Metals, Copyright 1987.
3. Not Used
4. R. Nickell, M. A. Rinckel, "Evaluation of Thermal Aging Embrittlement for Cast Austenitic Stainless Steel Components," TR-106092, Research Project 2643-33, Final Report, March 1996.
5. Metals Handbook, Desk Edition, American Society for Metals, Materials Park, OH, 1985.
6. M. G. Fontana, Corrosion Engineering, Third Edition, Copyright 1986, McGraw Hill.
7. License Renewal Application for St. Lucie Units 1 and 2, November 30, 2001, Appendix C.
8. Aging Management Guideline for Commercial Nuclear Power Plants – Electrical and Mechanical Penetrations, EPRI, Palo Alto, CA: 2002. 1003456

VII Auxiliary Systems  
 A1. New Fuel Storage

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-94	Structural Steel	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material	Chapter XI.S6, "Structures Monitoring Program"	No

VII Auxiliary Systems  
A2. Spent Fuel Storage

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-56	General piping and components	Stainless steel	Treated borated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
A-59	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
A-86	Spent fuel storage racks Neutron-absorbing sheets	Boraflex	Treated borated water	Reduction of neutron-absorbing capacity	Chapter XI.M22, "Boraflex Monitoring"	No
A-87	Spent fuel storage racks Neutron-absorbing sheets	Boraflex	Treated water	Reduction of neutron-absorbing capacity	Chapter XI.M22, "Boraflex Monitoring"	No
A-88	Spent fuel storage racks Neutron-absorbing sheets	Boral, boron steel	Treated borated water	Reduction of neutron-absorbing capacity and loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-89	Spent fuel storage racks Neutron-absorbing sheets	Boral, boron steel	Treated water	Reduction of neutron-absorbing capacity and loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
 A3. Spent Fuel Pool Cooling and Cleanup (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-15	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-39	General piping and components	Carbon steel with elastomer lining	Treated borated water	Loss of material (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-56	General piping and components	Stainless steel	Treated borated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No



VII Auxiliary Systems  
 A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-16	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-40	General piping and components	Carbon steel with elastomer lining or stainless steel cladding	Treated water	Loss of material (only for carbon steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-58	General piping and components	Stainless steel	Treated water	Loss of material	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
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-70	Heat exchanger tube side components including tubes	Stainless steel	Treated water	Loss of material	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

**VII Auxiliary Systems**  
**B. Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-06	Cranes - Structural girders	Carbon Steel	Air – indoor uncontrolled (Ext)	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for structural girders of cranes that fall within the scope of 10 CFR 54. See the Standard Review Plan, Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," for generic guidance for meeting the requirements of 10 CFR 54.21 (c).	Yes, TLAA
A-07	Cranes - Structural girders	Carbon Steel	Air – indoor uncontrolled (Ext)	Loss of material	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
A-05	Cranes - rails	Carbon Steel	Air – indoor uncontrolled (Ext)	Loss of material/ wear	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No

**VII Auxiliary Systems**  
**C1. Open-Cycle Cooling Water System (Service Water System)**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-01	Buried piping and components	Carbon steel (with or without coating or wrapping)	Soil	Loss of material	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
A-02	Buried piping and components	Gray cast iron	Soil	Loss of material/ including selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
A-32	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-38	General piping and components	Carbon steel (without lining/coating or with degraded lining/coating)	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-44	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-49	General piping and components	Copper alloy >15% Zn	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-51	General piping and components	Gray cast iron	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No

VII Auxiliary Systems  
 C1. Open-Cycle Cooling Water System (Service Water System)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-54	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-64	Heat exchanger tube side components including tubes	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-65	Heat exchanger tube side components including tubes	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-66	Heat exchanger tube side components including tubes	Copper alloy >15% Zn	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-72	Heat exchanger tubes	Copper alloy <15% Zn	Raw water	Reduction of heat transfer	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-74	Heat exchanger tubes	Copper alloy >15% Zn	Raw water	Reduction of heat transfer	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

VII Auxiliary Systems  
 C2. Closed-Cycle Cooling Water System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-50	General piping and components	Gray cast iron	Closed cycle cooling water	Loss of material/ including selective leaching	Chapter XI.M21, "Closed-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
A-52	General piping and components	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

**VII Auxiliary Systems  
C3. Ultimate Heat Sink**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-31	General piping and components	Carbon steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-43	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-48	General piping and components	Copper alloy >15% Zn	Raw water	Loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-53	General piping and components	Stainless steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

VII Auxiliary Systems  
D. Compressed Air System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-26	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-80	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No

VII Auxiliary Systems  
E1. Chemical and Volume Control System (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-34	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-57	General piping and components	Stainless steel	Treated borated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-69	Heat exchanger tube side components including tubes	Stainless steel	Treated borated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes. (See Oconee operating experience, License Renewal Application, Revision 2, June 1998, p. 3.4-26)	Yes, plant specific
A-76	High-pressure pump Casing and closure bolting	Stainless steel, carbon steel	Treated borated water	Cracking/cyclic loading	A plant-specific aging management program is to be evaluated.	Yes, plant specific



VII Auxiliary Systems  
 E1. Chemical and Volume Control System (Pressurized Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-84	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated borated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant specific

VII Auxiliary Systems  
 E2. Standby Liquid Control System (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-59	General piping and components	Stainless steel	Treated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No

VII Auxiliary Systems  
E3. Reactor Water Cleanup System (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-34	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-41	General piping and components	Cast austenitic stainless steel	Treated water > 140°F	Cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No
A-42	General piping and components	Cast austenitic stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-60	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No
A-62	General piping and components	Stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-67	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-68	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
 E3. Reactor Water Cleanup System (Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-71	Heat exchanger tube side components including tubes	Stainless steel	Treated water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-85	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
E4. Shutdown Cooling System (Older Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-35	General piping and components	Carbon steel	Treated water	Loss of material	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
A-37	General piping and components	Carbon steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-58	General piping and components	Stainless steel	Treated water	Loss of material	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
A-61	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking" and Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No

VII Auxiliary Systems  
 E4. Shutdown Cooling System (Older Boiling Water Reactor)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-62	General piping and components	Stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-63	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-67	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No

**VII Auxiliary Systems**  
**F1. Control Room Area Ventilation System**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-09	Ducting, piping and components external surfaces	Stainless steel	Condensation (Ext)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-11	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-12	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Int)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
 F1. Control Room Area Ventilation System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific



**VII Auxiliary Systems**  
**F2. Auxiliary and Radwaste Area Ventilation System**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-09	Ducting, piping and components external surfaces	Stainless steel	Condensation (Ext)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-11	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-12	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Int)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	Loss of material/ General, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems**  
**F2. Auxiliary and Radwaste Area Ventilation System**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems**  
**F3. Primary Containment Heating and Ventilation System**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-09	Ducting, piping and components external surfaces	Stainless steel	Condensation (Ext)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-11	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-12	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Int)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific

VII Auxiliary Systems  
 F3. Primary Containment Heating and Ventilation System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems**  
**F4. Diesel Generator Building Ventilation System**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-10	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-08	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	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-14	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-73	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-18	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-36	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-17	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

VII Auxiliary Systems  
 F4. Diesel Generator Building Ventilation System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-46	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems**  
**G. Fire Protection**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-19	Fire barrier penetration seals	Elastomer	Air – indoor uncontrolled	Change in material properties	Chapter XI.M26, "Fire Protection"	No
A-20	Fire barrier penetration seals	Elastomer	Air – outdoor	Change in material properties	Chapter XI.M26, "Fire Protection"	No
A-21	Fire doors	Carbon steel	Air – indoor uncontrolled	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
A-22	Fire doors	Carbon steel	Air – outdoor	Loss of material/ Wear	Chapter XI.M26, "Fire Protection"	No
A-28	General piping and components	Carbon steel	Fuel oil	Loss of material	Chapter XI.M26, "Fire Protection," and Chapter XI.M30, "Fuel Oil Chemistry"	No
A-33	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-45	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-47	General piping and components	Copper alloy >15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-55	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-82	Reactor coolant pump oil collection system Tank	Carbon steel	Lubricating oil	Loss of material	A plant specific aging management program that determines the thickness of the lower portion of the tank is to be evaluated. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-83	Reactor coolant pump oil collection system Piping, tubing, valve bodies	Carbon steel, copper alloy	Lubricating oil	Loss of material	A plant specific aging management program that monitors the degradation of the components is to be evaluated. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated

**VII Auxiliary Systems  
G. Fire Protection**

<b>Item</b>	<b>Structure and/or Component</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect/ Mechanism</b>	<b>Aging Management Program (AMP)</b>	<b>Further Evaluation</b>
A-90	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-91	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-92	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-93	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No



VII Auxiliary Systems  
H1. Diesel Fuel Oil System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-01	Buried piping and components	Carbon steel (with or without coating or wrapping)	Soil	Loss of material	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
A-24	General piping and components	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-30	General piping and components	Carbon steel	Fuel oil	Loss of material	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
A-95	Tank	Carbon steel	Air – outdoor (Ext)	Loss of material	Chapter XI.M29, "Aboveground Carbon Steel Tanks"	No

VII Auxiliary Systems  
H2. Emergency Diesel Generator System

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-23	General piping and components	Carbon steel	Air – indoor uncontrolled (Int or Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-25	General piping and components	Carbon steel	Closed cycle cooling water	Loss of Material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No
A-27	General piping and components	Carbon steel	Exhaust gases	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-29	General piping and components	Carbon steel	Fuel oil	Loss of material	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
A-32	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, “Open-Cycle Cooling Water System”	No

VII Auxiliary Systems  
I. Carbon Steel Components

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-03	Closure bolting In high-pressure or high-temperature systems	Carbon steel	Air with steam or water leakage	Loss of material	Chapter XI.M18, "Bolting Integrity"	No
A-04	Closure bolting In high-pressure or high-temperature systems	Carbon steel	Air with steam or water leakage	Cracking	Chapter XI.M18, "Bolting Integrity"	No
A-77	Piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-78	Piping and components external surfaces and bolting	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-79	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
A-81	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific

**VII Auxiliary Systems  
Additional MEAP Combinations Not Currently Addressed by NUREG-1801**

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
	General piping and components	Aluminum	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, "Boric Acid Corrosion"	No
	General piping and components	Carbon steel	Air – indoor controlled (Ext)	None	None	
	General piping and components	Carbon steel	Concrete	None	None	
	General piping and components	Carbon Steel	Dried Air	None	None	
	General piping and components	Carbon steel	Lubricating oil (no water pooling)	None	None	
	General piping and components	Carbon steel	Gas	None	None	
	General piping and components	Cast austenitic stainless steel	Air – indoor uncontrolled (Ext)	None	None	
	General piping and components	Copper Alloy	Dried Air	None	None	
	General piping and components	Copper alloy	Gas	None	None	
	General piping and components	Copper-alloy	Lubricating oil (no water pooling)	None	None	
	General piping and components	Copper-alloy <15 % Zn	Air with boric acid leakage	None	None	
	General piping and components	Copper-alloy <15 % Zn	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
	General piping and components	Galvanized steel	Air – indoor uncontrolled	None	None	
	General piping and components	Glass	Air – indoor uncontrolled (Ext)	None	None	
	General piping and components	Glass	Lubricating oil	None	None	
	General piping and components	Nickel-alloy	Air – indoor uncontrolled (Ext)	None	None	
	General piping and components	Stainless steel	Air – indoor uncontrolled (Ext)	None	None	
	General piping and components	Stainless steel	Air with boric acid leakage	None	None	
	General piping and components	Stainless steel	Concrete	None	None	
	General piping and components	Stainless Steel	Dried Air	None	None	
	General piping and components	Stainless steel	Lubricating oil (no water pooling)	None	None	

VII Auxiliary Systems  
 Additional MEAP Combinations Not Currently Addressed by NUREG-1801

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
	General piping and components	Stainless steel	Gas	None	None	
	General piping and components	Stainless steel	Treated borated water	Loss of material	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-01	H1.1-b C1.1-b	Buried piping and components	Carbon steel (with or without coating or wrapping)	Soil	Loss of material	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
A-02	C1.1-c	Buried piping and components	Gray cast iron	Soil	Loss of material/ including selective leaching	Chapter XI.M33, "Selective Leaching of Materials"	No
A-03	I.2-a	Closure bolting In high-pressure or high-temperature systems	Carbon steel	Air with steam or water leakage	Loss of material	Chapter XI.M18, "Bolting Integrity"	No
A-04	I.2-b	Closure bolting In high-pressure or high-temperature systems	Carbon steel	Air with steam or water leakage	Cracking	Chapter XI.M18, "Bolting Integrity"	No
A-05	B.2-a	Cranes - rails	Carbon Steel	Air – indoor uncontrolled (Ext)	Loss of material/ wear	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
A-06	B.1-a	Cranes - Structural girders	Carbon Steel	Air – indoor uncontrolled (Ext)	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation for structural girders of cranes that fall within the scope of 10 CFR 54. See the Standard Review Plan, Section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," for generic guidance for meeting the requirements of 10 CFR 54.21 (c).	Yes, TLAA

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-07	B.1-b	Cranes - Structural girders	Carbon Steel	Air – indoor uncontrolled (Ext)	Loss of material	Chapter XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems"	No
A-08	F1.1-a F2.1-a F3.1-a F4.1-a	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material General, pitting, crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-09	F1.4-a F2.4-a F3.4-a	Ducting, piping and components external surfaces	Stainless steel	Condensation (Ext)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-10	F1.1-a F1.4-a F2.1-a F2.4-a F3.1-a F3.4-a F4.1-a	Ducting, piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material/ General, pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-11	F1.4-a F2.4-a F3.4-a	Ducting, piping and components internal surfaces	Carbon steel	Air – indoor uncontrolled (Int)	Loss of material/ General, pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-12	F1.4-a F2.4-a F3.4-a	Ducting, piping and components internal surfaces	Stainless steel	Condensation (Int)	Loss of material/ Pitting, and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-13	F1.1-a F2.1-a F3.1-a F4.1-a	Ducting, piping and components internal surfaces frequently wetted	Carbon steel	Condensation (Int)	Loss of material General, pitting, crevice corrosion, and microbiologically influenced corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-14	F1.1-a F2.1-a F3.1-a F4.1-a	Ducting, piping and components internal surfaces frequently wetted	Galvanized steel	Condensation (Int)	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-15	A3.2-a A3.2-d A3.3-a A3.3-d A3.5-a A3.5-c	Elastomer lining	Elastomers	Treated borated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-16	A4.2-a A4.2-b A4.3-a A4.3-b A4.5-a A4.5-b	Elastomer lining	Elastomers	Treated water	Change in material properties	A plant-specific aging management program that determines and assesses the qualified life of the linings in the environment is to be evaluated.	Yes, plant specific
A-17	F1.1-b F1.4-b F2.1-b F2.4-b F3.1-b F3.4-b F4.1-b	Elastomer seals and components	Elastomers	Air – indoor uncontrolled > 95°F (Int)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-18	F1.1-c F2.1-c F3.1-c F4.1-c	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Int)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-19	G.1-a G.2-a G.3-a G.4-a	Fire barrier penetration seals	Elastomer	Air – indoor uncontrolled	Change in material properties	Chapter XI.M26, "Fire Protection"	No



Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-20	G.1-a G.2-a G.3-a G.4-a	Fire barrier penetration seals	Elastomer	Air – outdoor	Change in material properties	Chapter XI.M26, “Fire Protection”	No
A-21	G.1-d G.2-d G.3-d G.4-d G.5-c	Fire doors	Carbon steel	Air – indoor uncontrolled	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
A-22	G.1-d G.2-d G.3-d G.4-d	Fire doors	Carbon steel	Air – outdoor	Loss of material/ Wear	Chapter XI.M26, “Fire Protection”	No
A-23	H2.2-a H2.3-a	General piping and components	Carbon steel	Air – indoor uncontrolled (Int or Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-24	H1.1-a H1.2-a H1.3-a	General piping and components	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-25	C2.1-a C2.2-a C2.3-a C2.4-a C2.5-a F1.3-a F2.3-a F3.3-a F4.3-a H2.1-a	General piping and components	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, “Closed-Cycle Cooling Water System”	No

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-26	D.1-a D.2-a D.3-a D.4-a D.5-a D.6-a	General piping and components	Carbon steel	Condensation (Int)	Loss of material	Chapter XI.M24, "Compressed Air Monitoring"	No
A-27	H2.4-a	General piping and components	Carbon steel	Exhaust gases	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-28	G.8-a	General piping and components	Carbon steel	Fuel oil	Loss of material	Chapter XI.M26, "Fire Protection," and Chapter XI.M30, "Fuel Oil Chemistry"	No
A-29	H2.5-a	General piping and components	Carbon steel	Fuel oil	Loss of material	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
A-30	H1.4-a	General piping and components	Carbon steel	Fuel oil	Loss of material	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
A-31	C3.1-a C3.2-a C3.3-a	General piping and components	Carbon steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-32	C1.2-a C1.5-a C1.6-a H2.1-b	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-33	G.6-a G.6-b	General piping and components	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-34	E1.1-a E1.3-a E1.7-a E1.8-a E3.2-c	General piping and components	Carbon steel	Air – indoor uncontrolled	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-35	E4.1-a E4.2-a	General piping and components	Carbon steel	Treated water	Loss of material	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
A-36	F1.1-b F1.4-b F2.1-b F2.4-b F3.1-b F3.4-b F4.1-b	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Change in material properties	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-37	E4.1-b	General piping and components	Carbon steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-38	C1.1-a	General piping and components	Carbon steel (without lining/coating or with degraded lining/coating)	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-39	A3.2-a A3.3-a A3.5-a	General piping and components	Carbon steel with elastomer lining	Treated borated water	Loss of material (only for carbon steel after lining degradation)	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  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
A-40	A4.2-a A4.3-a A4.5-a	General piping and components	Carbon steel with elastomer lining or stainless steel cladding	Treated water	Loss of material (only for carbon steel after lining/cladding degradation)	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)  The AMP is to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-41	E3.2-a	General piping and components	Cast austenitic stainless steel	Treated water > 140°F	Cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No
A-42	E3.2-b	General piping and components	Cast austenitic stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-43	C3.1-a C3.2-a	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-44	C1.1-a C1.2-a	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-45	G.6-b	General piping and components	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-46	F1.2-a F2.2-a F3.2-a F4.2-a	General piping and components	Copper alloy >15% Zn	Condensation (Ext)	Loss of material/ Pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-47	G.6-b	General piping and components	Copper alloy >15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-48	C3.1-a C3.2-a	General piping and components	Copper alloy >15% Zn	Raw water	Loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-49	C1.1-a C1.2-a	General piping and components	Copper alloy >15% Zn	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-50	C2.3-a	General piping and components	Gray cast iron	Closed cycle cooling water	Loss of material/ including selective leaching	Chapter XI.M21, "Closed-Cycle Cooling Water System," and Chapter XI.M33, "Selective Leaching of Materials"	No
A-51	C1.5-a	General piping and components	Gray cast iron	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-52	C2.2-a	General piping and components	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-53	C3.2-a	General piping and components	Stainless steel	Raw water	Loss of material	Chapter XI.M20, "Open-Cycle Cooling Water System"	No

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-54	C1.1-a C1.2-a C1.4-a C1.6-a	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-55	G.6-a G.6-b	General piping and components	Stainless steel	Raw water	Loss of material and macrofouling	Chapter XI.M27, "Fire Water System"	No
A-56	A2.1-c A3.3-b	General piping and components	Stainless steel	Treated borated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714	No
A-57	E1.1-a E1.3-a E1.7-a E1.8-a	General piping and components	Stainless steel	Treated borated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-58	A4.1-a A4.6-a E4.1-a	General piping and components	Stainless steel	Treated water	Loss of material	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
A-59	A2.1-c E2.1-a E2.2-a E2.3-a E2.4-a	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
A-60	E3.1-a	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M25, "BWR Reactor Water Cleanup System"	No

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-61	E4.1-c E4.3-a	General piping and components	Stainless steel	Treated water > 140°F	Cracking	Chapter XI.M7, "BWR Stress Corrosion Cracking" and Chapter XI.M2, "Water Chemistry," for BWR water in BWRVIP-29 (EPRI TR-103515)	No
A-62	E3.1-b E3.2-b E4.1-b	General piping and components	Stainless steel	Treated water	Cumulative fatigue damage	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.3, "Metal Fatigue," for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A-63	A3.4-a A4.4-a E1.8-c E4.4-a	Heat exchanger shell side components including tubes	Carbon steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-64	C1.3-a	Heat exchanger tube side components including tubes	Carbon steel	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-65	C1.3-a	Heat exchanger tube side components including tubes	Copper alloy <15% Zn	Raw water	Loss of material and macrofouling	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-66	C1.3-a	Heat exchanger tube side components including tubes	Copper alloy >15% Zn	Raw water	Macrofouling and loss of material/ including selective leaching	Chapter XI.M20, "Open-Cycle Cooling Water System" and Chapter XI.M33, "Selective Leaching of Materials"	No
A-67	E3.4-b E4.4-a	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water	Loss of material	Chapter XI.M21, "Closed-Cycle Cooling Water System"	No
A-68	E3.4-a	Heat exchanger shell side components including tubes	Stainless steel	Closed cycle cooling water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-69	E1.8-b	Heat exchanger tube side components including tubes	Stainless steel	Treated borated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes. (See Oconee operating experience, License Renewal Application, Revision 2, June 1998, p. 3.4-26)	Yes, plant specific
A-70	A4.4-b	Heat exchanger tube side components including tubes	Stainless steel	Treated water	Loss of material	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
A-71	E3.4-a	Heat exchanger tube side components including tubes	Stainless steel	Treated water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-72	C1.3-b	Heat exchanger tubes	Copper alloy <15% Zn	Raw water	Reduction of heat transfer	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-73	F1.1-c F2.1-c F3.1-c F4.1-c	Elastomer seals and components	Elastomers	Air – indoor uncontrolled (Ext)	Loss of material/ Wear	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-74	C1.3-b	Heat exchanger tubes	Copper alloy >15% Zn	Raw water	Reduction of heat transfer	Chapter XI.M20, "Open-Cycle Cooling Water System"	No
A-75		Not used					



Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-76	E1.5-a	High-pressure pump Casing and closure bolting	Stainless steel, carbon steel	Treated borated water	Cracking/cyclic loading	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-77	I.1-b	Piping and components external surfaces and bolting	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-78	I.1-b	Piping and components external surfaces and bolting	Carbon steel	Air – outdoor (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-79	A3.1-a A3.2-b A3.2-c A3.3-c A3.4-b A3.5-b A3.6-a E1.1-b E1.2-a E1.3-b E1.4-a E1.5-b E1.6-a E1.7-b E1.8-d E1.9-a E1.10-a I.1-a	Piping and components external surfaces and bolting	Carbon steel	Air with boric acid leakage	Loss of material/ Boric acid corrosion	Chapter XI.M10, “Boric Acid Corrosion”	No
A-80	D.1-a D.2-a D.3-a D.4-a D.5-a D.6-a	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	Chapter XI.M24, “Compressed Air Monitoring”	No
A-81	I.1-b	Piping and components external surfaces and bolting	Carbon steel	Condensation (Ext)	Loss of material	A plant-specific aging management program is to be evaluated.	Yes, plant specific

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-82	G.7-a	Reactor coolant pump oil collection system Tank	Carbon steel	Lubricating oil	Loss of material	A plant specific aging management program that determines the thickness of the lower portion of the tank is to be evaluated. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program.	Yes, detection of aging effects is to be evaluated
A-83	G.7-b	Reactor coolant pump oil collection system Piping, tubing, valve bodies	Carbon steel, copper alloy	Lubricating oil	Loss of material	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
A-84	E1.7-c	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated borated water >140°F	Cracking	Chapter XI.M2, "Water Chemistry," for PWR primary water in EPRI TR-105714  The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading, or loss of material due to pitting and crevice corrosion. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes, plant specific
A-85	E3.3-d	Regenerative heat exchanger tube and shell side components including tubes	Stainless steel	Treated water >140°F	Cracking/Stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-86	A2.1-a	Spent fuel storage racks Neutron-absorbing sheets	Boraflex	Treated borated water	Reduction of neutron-absorbing capacity	Chapter XI.M22, "Boraflex Monitoring"	No
A-87	A2.1-a	Spent fuel storage racks Neutron-absorbing sheets	Boraflex	Treated water	Reduction of neutron-absorbing capacity	Chapter XI.M22, "Boraflex Monitoring"	No

Line	Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A-88	A2.1-b	Spent fuel storage racks Neutron-absorbing sheets	Boral, boron steel	Treated borated water	Reduction of neutron-absorbing capacity and loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-89	A2.1-b	Spent fuel storage racks Neutron-absorbing sheets	Boral, boron steel	Treated water	Reduction of neutron-absorbing capacity and loss of material/ General corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific
A-90	G.1-b G.2-b G.3-b G.4-b G.5-a	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Concrete cracking and spalling	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-91	G.1-c G.2-c G.3-c G.4-c G.5-b	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – indoor uncontrolled	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-92	G.1-b G.2-b G.3-b G.4-b	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Concrete cracking and spalling	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-93	G.1-c G.2-c G.3-c G.4-c	Structural fire barriers – walls, ceilings and floors	Reinforced concrete	Air – outdoor	Loss of material/ Corrosion of embedded steel	Chapter XI.M26, “Fire Protection” and Chapter XI.S6, “Structures Monitoring Program”	No
A-94	A1.1-a	Structural Steel	Carbon steel	Air – indoor uncontrolled (Ext)	Loss of material	Chapter XI.S6, “Structures Monitoring Program”	No
A-95	H1.4-b	Tank	Carbon steel	Air – outdoor (Ext)	Loss of material	Chapter XI.M29, “Aboveground Carbon Steel Tanks”	No