CHAPTER II

CONTAINMENT STRUCTURES

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CONTAINMENT STRUCTURES

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PWR CONTAINMENTS

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A1. CONCRETE CONTAINMENTS (REINFORCED AND PRESTRESSED)

A1.1 Concrete Elements

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A1. CONCRETE CONTAINMENTS (REINFORCED AND PRESTRESSED)

Systems, Structures, and Components

This section addresses the elements of PWR concrete containment structures. Concrete containment structures are divided into three elements: concrete, steel, and prestressing system.

System Interfaces

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

II Containment Structures

A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A1.1-a	Concrete elements: Dome; wall; basemat; ring girder; buttresses	Concrete	Outside containment	Loss of material (spalling, scaling) and cracking / Freeze-thaw	Chapter XI.S2, "ASME Section XI, Subsection IWL" As described in NUREG-1557, freeze-thaw does not cause loss of material from reinforced concrete in foundations, and in above and below grade exterior concrete, for plants located in a geographic region of negligible weathering conditions (weathering index <100 day-inch/yr). Loss of material from such concrete is not significant at plants located in areas in which weathering conditions are severe (weathering index >500 day-inch/yr) or moderate (100-500 day-inch/yr), provided that the concrete mix design meets the air content (entrained air 3-6%) and water-to-cement ratio (0.35-0.45) specified in ACI 318-63 (or later edition) or ACI 349-85 (or later edition). The weathering index is defined in ASTM C33-90, Table 3, Footnote E. Fig. 1 of ASTM C33-90 illustrates the various weathering index regions throughout the U.S.	No
A1.1-b	Concrete elements: Dome; wall; basemat; ring girder; buttresses	Concrete	Outside containment	Increase in porosity, permeability / Leaching of calcium hydroxide	Chapter XI.S2, "ASME Section XI, Subsection IWL" Accessible Areas: Leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is	Yes, if leaching of calcium hydroxide is signifi-cant for inaccess-ible areas

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled. Cracking is controlled through proper arrangement and distribution of reinforcing bars. All of the above characteristics are assured if the concrete was constructed with the guidance of ACI 201.2R-77. Inspections performed in accordance with IWL will indicate the absence or presence of leaching of calcium hydroxide. Inaccessible Areas: For below-grade inaccessible areas (basemat and concrete wall), a plant-specific aging management program is required only if the above conditions are not satisfied.	
A1.1-c	Concrete elements: Dome; wall; basemat; ring girder; buttresses	Concrete	Inside or outside containment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling) / Aggressive chemical attack	Chapter XI.S2, “ASME Section XI, Subsection IWL” Accessible Areas: For interior and above-grade exterior reinforced concrete, aggressive chemical attack is not significant if the concrete is not exposed to an aggressive environment (pH < 5.5), or to chloride or sulfate solutions beyond defined limits (> 500 ppm chloride, or > 1,500 ppm sulfate). Inspections performed in accordance with IWL will	Yes, if aggressive chemical attack is significant for inaccess-ible areas

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) indicate the absence or presence of aggressive chemical attack. Inaccessible Areas: For below-grade exterior reinforced concrete (basemat, embedded walls), a plant-specific aging management program is required only if the below-grade environment is aggressive (pH < 5.5, chlorides > 500 ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. If the below-grade environment is not aggressive, this aging effect is not significant. Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is not aggressive.	
A1.1-d	Concrete elements: Dome; wall; basemat; ring girders; buttresses	Concrete	Inside or outside containment	Cracking due to expansion / Reaction with aggregates	Chapter XI.S2, “ASME Section XI, Subsection IWL” As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially	No

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with the guidance of ACI 201.2R-77. Inspections performed in accordance with IWL will indicate the absence or presence of surface degradation due to reaction with aggregates.	
A1.1-e	Concrete elements: Dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete; carbon steel	Inside or outside containment	Cracking, loss of bond, and loss of material (spalling, scaling) / Corrosion of embedded steel	Chapter XI.S2, "ASME Section XI, Subsection IWL" Accessible Areas: For exterior above-grade and interior embedded steel, corrosion is not significant if the steel is not exposed to an aggressive environment (concrete pH < 11.5 or chlorides > 500 ppm). Alternatively, if the environment surrounding the concrete is not aggressive (pH > 5.5, chlorides < 500 ppm, sulfates < 1,500 ppm), corrosion of embedded steel is not significant. If such steel is exposed to an aggressive environment, corrosion is not significant if the concrete in which the steel is embedded has a low water-to-cement ratio (0.35-0.45), adequate air entrainment (3-6%), low permeability, and is designed in accordance with ACI 318-63 (or later edition) or ACI 349-85 (or later edition). Inspections performed in accordance with IWL will indicate the absence or presence of visible corrosion	Yes, if corrosion of embedded steel is significant for inaccess-ible areas

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) of embedded steel. Inaccessible Areas: For below-grade exterior reinforced concrete (basemat, embedded walls), a plant-specific aging management program is required only if the below-grade environment is aggressive (pH < 5.5, chlorides > 500 ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. If the below-grade environment is not aggressive, this aging effect is not significant. Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is not aggressive.	
A1.1-f	Concrete elements: Dome; wall; basemat; ring girder; buttresses	Concrete	Inside or outside containment	Cracks; distortion; increase in component stress level / Settlement	Chapter XI.S6, “Structures Monitoring Program” The initial licensing basis for some plants included a program to monitor settlement. If no settlement was evident during the first decade or so, the NRC may have given the licensee approval to discontinue the program. However, if a de-watering system is relied upon for control of settlement, then the licensee	No, if within the scope of the applicant’s structures monitoring program

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) is to ensure proper functioning of the de-watering system through the period of extended operation.	
A1.1-g	Concrete elements: Foundation; subfoundation	Concrete; porous concrete	Flowing water under foundation	Reduction in foundation strength, cracking, differential settlement / Erosion of porous concrete subfoundation	Chapter XI.S6, "Structures Monitoring Program" Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program
A1.1-h	Concrete elements: Dome; wall; basemat; ring girder; buttresses	Concrete	Inside or outside containment	Reduction of strength and modulus / Elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program The implementation of 10 CFR 50.55a and IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as	Yes, if applicable.

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	
A1.2-a	Steel elements: Liner; liner anchors; integral attachments	Carbon steel	Inside or outside containment	Loss of material / Corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE" For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: 1. Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. 2. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner.	Yes, if corrosion is significant for inaccess-ible areas

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) 3. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. 4. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner. If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is required. Chapter XI.S4, "10 CFR Part 50, Appendix J" and If a coatings program is credited for managing loss of material due to corrosion during the current licensing term (e.g., relief request from IWE), then it is to be continued during the period of extended operation. See Chapter XI.S8, "Protective Coating Monitoring and Maintenance Program."	 No No
A1.3-a	Prestressing system: Tendons; anchorage components	Carbon steel	Inside or outside containment	Loss of material / Corrosion	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No

II Containment Structures
A1. PWR Concrete Containments (Reinforced and Prestressed)

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A1.3-b	Prestressing system: Tendons; anchorage components	Carbon steel	Inside or outside containment	Loss of prestress / Relaxation; shrinkage; creep; elevated temperature	Loss of tendon prestress is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.5, "Concrete Containment Tendon Prestress" for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii). See Chapter X.S1 of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii). For periodic monitoring of prestress, see Chapter XI.S2.	Yes, TLAA

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A2. STEEL CONTAINMENTS

A2.1 Steel Elements

A2.2 Concrete Elements

A2. STEEL CONTAINMENTS

Systems, Structures, and Components

This section addresses the elements of PWR steel containment structures. Steel containment structures are divided into two elements: steel and concrete.

System Interfaces

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

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A2.1-a	Steel elements: Dome; wall; embedded floor	Carbon steel	Inside or outside containment	Loss of material / Corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE" For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: 1. Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. 2. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. 3. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. 4. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner. If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is required.	Yes, if corrosion is significant for inaccess-ible areas

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) Chapter XI.S4, "10 CFR Part 50, Appendix J" and If a coatings program is credited for managing loss of material due to corrosion during the current licensing term (e.g., relief request from IWE), then it is to be continued during the period of extended operation. See Chapter XI.S8, "Protective Coating Monitoring and Maintenance Program"	No No
A2.2-a	Concrete elements: Basemat	Concrete	Outside containment	Loss of material (spalling, scaling) and cracking /Freeze-thaw	Chapter XI.S2, "ASME Section XI, Subsection IWL" As described in NUREG-1557, freeze-thaw does not cause loss of material from reinforced concrete in foundations, and in above and below grade exterior concrete, for plants located in a geographic region of negligible weathering conditions (weathering index <100 day-inch/yr). Loss of material from such concrete is not significant at plants located in areas in which weathering conditions are severe (weathering index >500 day-inch/yr) or moderate (100-500 day-inch/yr), provided that the concrete mix design meets the air content (entrained air 3-6%) and water-to-cement ratio (0.35-0.45) specified in ACI 318-63 (or later edition) or ACI 349-85 (or later edition).	No

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) The weathering index is defined in ASTM C33-90, Table 3, Footnote E. Fig. 1 of ASTM C33-90 illustrates the various weathering index regions throughout the U.S.	
A2.2-b	Concrete elements: Basemat	Concrete	Outside containment	Increase in porosity, permeability / Leaching of calcium hydroxide	Chapter XI.S2, "ASME Section XI, Subsection IWL" Accessible Areas: Leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Even if reinforced concrete is exposed to flowing water, such leaching is not significant if the concrete is constructed to ensure that it is dense, well-cured, has low permeability, and that cracking is well controlled. Cracking is controlled through proper arrangement and distribution of reinforcing bars. All of the above characteristics are assured if the concrete was constructed with the guidance of ACI 201.2R-77. Inspections performed in accordance with IWL will indicate the absence or presence of leaching of calcium hydroxide. Inaccessible Areas: For below grade inaccessible areas (basemat and concrete wall), a plant-specific aging management program is required only if the above conditions are not satisfied.	Yes, if leaching of calcium hydroxide is significant for inaccess-ible areas

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A2.2-c	Concrete elements: Basemat	Concrete	Inside or outside containment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling) / Aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL" Accessible Areas: For interior and above-grade exterior reinforced concrete, aggressive chemical attack is not significant if the concrete is not exposed to an aggressive environment (pH < 5.5), or to chloride or sulfate solutions beyond defined limits (> 500 ppm chloride, or > 1,500 ppm sulfate). Inspections performed in accordance with IWL will indicate the absence or presence of aggressive chemical attack. Inaccessible Areas: For below-grade exterior reinforced concrete (basemat, embedded walls), a plant-specific aging management program is required only if the below-grade environment is aggressive (pH < 5.5, chlorides > 500 ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. If the below-grade environment is not aggressive, this aging effect is not significant. Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to	Yes, if aggressive chemical attack is significant for inaccess-ible areas

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) demonstrate that the below-grade environment is not aggressive.	
A2.2-d	Concrete elements: Basemat	Concrete	Inside or outside containment	Cracking due to expansion / Reaction with aggregates	Chapter XI.S2, "ASME Section XI, Subsection IWL" As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295-54 or ASTM C227-50 can demonstrate that those aggregates do not react within reinforced concrete. For potentially reactive aggregates, aggregate-reinforced concrete reaction is not significant if the concrete was constructed in accordance with the guidance of ACI 201.2R-77. Inspections performed in accordance with IWL will indicate the absence or presence of surface degradation due to reaction with aggregates.	No
A2.2-e	Concrete elements: Basemat and reinforcing steel	Concrete; carbon steel	Inside or outside containment	Cracking, loss of bond, and loss of material (spalling, scaling) / Corrosion of embedded steel	Chapter XI.S2, "ASME Section XI, Subsection IWL" Accessible Areas: For exterior above-grade and interior embedded steel, corrosion is not significant if the steel is not exposed to an aggressive environment (concrete pH < 11.5 or chlorides > 500 ppm). Alternatively, if the environment surrounding the concrete is non-aggressive (pH > 5.5, chlorides < 500 ppm,	Yes, if corrosion of embedded steel is significant for inaccess-ible areas

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) sulfates < 1,500 ppm), corrosion of embedded steel is not significant. If such steel is exposed to an aggressive environment, corrosion is not significant if the concrete in which the steel is embedded has a low water-to-cement ratio (0.35-0.45), adequate air entrainment (3-6%), low permeability, and is designed in accordance with ACI 318-63 (or later edition) or ACI 349-85 (or later edition). Inspections performed in accordance with IWL will indicate the absence or presence of visible corrosion of embedded steel. Inaccessible Areas: For below-grade exterior reinforced concrete (basemat, embedded walls), a plant-specific aging management program is required only if the below-grade environment is aggressive (pH < 5.5, chlorides > 500 ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. If the below-grade environment is not aggressive, this aging effect is not significant. Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to	

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
					(continued) demonstrate that the below-grade environment is not aggressive.	
A2.2-f	Concrete elements: Basemat	Concrete	Inside or outside containment	Cracks; distortion; increase in component stress level / Settlement	Chapter XI.S6, "Structures Monitoring Program" The initial Licensing Basis for some plants included a program to monitor settlement. If no settlement was evident during the first decade or so, the NRC may have given the licensee approval to discontinue the program. However, if a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program
A2.2-g	Concrete elements: Foundation; subfoundation	Concrete; porous concrete	Flowing water under foundation	Reduction in foundation strength, cracking, differential settlement / Erosion of porous concrete subfoundation	Chapter XI.S6, "Structures Monitoring Program" Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program

II Containment Structures
A2. PWR Steel Containments

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A2.2-h	Concrete elements: Basemat	Concrete	Inside or outside containment	Reduction of strength and modulus / Elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program The implementation of 10 CFR 50.55a and IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. Higher temperatures than given above may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	Yes, if applicable

A3. COMMON COMPONENTS

A3.1 Penetration Sleeves, Penetration Bellows, Dissimilar Metal Welds

A3.2 Personnel Airlock, Equipment Hatch

A3.3 Seals, Gaskets, and Moisture Barriers (Caulking, Flashing, and Other Sealants)

A3. COMMON COMPONENTS

Systems, Structures, and Components

This section addresses the common components of PWR containments. The common components include penetration sleeves and bellows; dissimilar metal welds; personnel airlock; equipment hatch; and seals, gaskets, and moisture barriers.

System Interfaces

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

II Containment Structures
A3. PWR Containment Common Components

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A3.1-a	Penetration sleeves	Carbon steel; dissimilar metal welds	Inside or outside containment	Loss of material / Corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE," (Note: IWE examination category E-F, surface examination of dissimilar metal welds, is optional) Chapter XI.S4, "10 CFR Part 50, Appendix J," and If a coatings program is credited for managing loss of material due to corrosion during the current licensing term (e.g., relief request from IWE), then it is to be continued during the period of extended operation. See Chapter XI.S8, "Protective Coating Monitoring and Maintenance Program"	No No No
A3.1-b	Penetration sleeves; penetration bellows	Carbon Steel; stainless steel; dissimilar metal welds	Inside or outside containment	Cumulative fatigue damage / Fatigue (Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis" for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
A3.1-c	Penetration sleeves; penetration bellows	Carbon steel; stainless steel; dissimilar metal welds	Inside or outside containment	Cracking / Cyclic loading (CLB fatigue analysis does not exist)	Chapter XI.S1 "ASME Section XI, Subsection IWE " and Chapter XI.S4, "10 CFR Part 50, Appendix J" Evaluation of 10 CFR 50.55a/IWE is augmented as follows: *(4) Detection of Aging Effects:* VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated

II Containment Structures
A3. PWR Containment Common Components

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

II Containment Structures
A3. PWR Containment Common Components

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
A3.2-a	Personnel airlock; equipment hatch	Carbon steel	Inside or outside containment	Loss of material / Corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE," Chapter XI.S4, "10 CFR Part 50, Appendix J," and If a coatings program is credited for managing loss of material due to corrosion during the current licensing term (e.g., relief request from IWE), then it is to be continued during the period of extended operation. See Chapter XI.S8, "Protective Coating Monitoring and Maintenance Program."	No No No
A3.2-b	Personnel airlock; equipment hatch: Locks, hinges, and closure mechanisms	Carbon Steel	Inside or outside containment	Loss of leak tightness in closed position / Mechanical wear of locks, hinges and closure mechanisms	Chapter XI.S4, "10 CFR Part 50, Appendix J" and Plant Technical Specifications	No
A3.3-a	Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Various	Inside or outside containment	Loss of sealing; leakage through containment / Deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Chapter XI.S1, "ASME Section XI, Subsection IWE" Leak tightness will be monitored by 10 CFR Part 50, Appendix J Leak Rate Tests for pressure boundary, seals and gaskets (including O-rings).	No

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