BWR CONTAINMENTS

B1. Mark I Containments

B2. Mark II Containments

B3. Mark III Containments

B4. Common Components

(refined outline to be added when issued for public comment)

Explanation of September 30, 2004 changes in preliminary interim draft chapter outline and aging management review (AMR) tables: Within the AMR tables, this update process increases license renewal review efficiency by:

- Consolidating components (combining similar or equivalent components with matching materials, environment and AMP into a single line-item),
- Increasing consistency between **M**aterial/**E**nvironment/**A**ging effects/aging management **P**rogram (MEAP) combinations between systems (some existing MEAPs had multiple definitions that, based on the aging effect, could be broadened to envelope these into a singe MEAP),
- Correcting any inconsistencies in the 2001 edition of the GALL Report,
- Updating references to the appropriate aging management programs, and
- Incorporating line-item changes based on approved staff SER positions or interim staff guidance.

The principal effect of this change is that the tables present the MEAP combinations at a higher level, and the prior detail within a structure or component line item is no longer explicitly presented. Consequently, the identifiers for subcomponents within a line item are no longer presented in the tables. As a result, the introductory listings of these subcomponents (originally in text preceding each table) have been deleted.

The following AMR tables contain a revised “Item” column and a new column titled “Link”, which was not contained in the July 2001 revision. The “Item” number is a unique identifier that is used for traceability and, as mentioned above, no longer presents the detailed subcomponent identification. The link identifies the original item in the current version of the GALL Report when applicable (items added to this list refer to bases statements not yet available).

By January 30, 2005, the NRC staff plans to issue a revised GALL Report (NUREG-1801) and SRP-LR (NUREG-1800) for public comment. NRC anticipates re-numbering the line-items to provide an improved unique identifier as part of the public comment document. Also as part of the public comment process, the NRC will issue a NUREG documenting the basis for the proposed changes to the GALL Report and the SRP-LR. This NUREG bases

document will be an aid for those reviewing the revised documents to understand what was changed and the basis for the proposed changes.

B1. MARK I CONTAINMENTS

Systems, Structures, and Components

This section addresses the elements of BWR Mark I containment structures. Mark I steel containments are discussed in II.B1.1.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation system (V.C), and standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the NSSS components and containment internal structures.

II B1.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-23	II.B1.1.1-e	Steel elements: Drywell head; downcomers	Steel; graphite plate	Air – indoor uncontrolled	Fretting or lockup/ mechanical wear	Chapter XI.S1, “ASME Section XI, Subsection IWE”	No

II CONTAINMENT STRUCTURES B1.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-19	II.B1.1.1-a	Steel elements: Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; ECCS suction header NOTE: Inspection of containment supports is addressed by ASME Section XI, Subsection IWF (see III.B1.3) This is essentially same as C-09, except for the structural components.	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE" For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. 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 inaccessible areas No

II CONTAINMENT STRUCTURES B1.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-20	II.B1.1.1-b	Steel elements: Torus; vent line; vent header; vent line bellows; downcomers Essentially same as C-14, except for the structural components	Stainless steel; steel	Air – indoor uncontrolled	Cracking/ cyclic loading (CLB fatigue analysis does not exist)	Chapter XI.S1 “ASME Section XI, Subsection IWE “ and Chapter XI.S4, “10 CFR Part 50, Appendix J” Evaluation of 10 CFR 50.55a/IWE is augmented as follows: (4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated
C-21	II.B1.1.1-c	Steel elements: Torus; vent line; vent header; vent line bellows; downcomers Essentially same as C-13, except for the structural components	Stainless steel; steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue (Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, “Containment Liner Plate and Penetration Fatigue Analysis” for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA

II B1.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-22	II.B1.1.1-d	Steel elements: Vent line bellows Essentially same as C-15, except for the structural components and materials	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, "ASME Section XI, Subsection IWE " and Chapter XI.S4, "10 CFR Part 50, Appendix J" Evaluation of 10 CFR 50.55a/IWE is augmented as follows: (4) Detection of Aging Effects: Stress corrosion cracking (SCC) is a concern for dissimilar metal welds. In the case of bellows assemblies, SCC may cause aging effects particularly if the material is not shielded from a corrosive environment. Subsection IWE covers inspection of these items under examination categories E-B, E-F, and E-P (10 CFR Part 50, Appendix J pressure tests). 10 CFR 50.55a identifies examination categories E-B and E-F as optional during the current term of operation. For the extended period of operation, Examination Categories E-B and E-F, and additional appropriate examinations to detect SCC in bellows assemblies and dissimilar metal welds are	Yes, detection of aging effects is to be evaluated

II CONTAINMENT STRUCTURES B1.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						warranted to address this issue. (10) Operating Experience: IN 92-20 describes an instance of containment bellows cracking, resulting in loss of leak tightness.	

B2. MARK II CONTAINMENTS

B2.1 Steel Containments

B2.2 Concrete Containments

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B2. Mark II Containments

Systems, Structures, and Components

This section addresses the elements of BWR Mark II containment structures. Mark II steel containments are discussed in II.B2.1. Mark II concrete containments are discussed in II.B2.2.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation system (V.C), and standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the NSSS components and containment internal structures.

II B2.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-14	II.B2.1.1-b	Penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled	Cracking/ cyclic loading (CLB fatigue analysis does not exist)	Chapter XI.S1 "ASME Section XI, Subsection IWE " and Chapter XI.S4, "10 CFR Part 50, Appendix J" Evaluation of 10 CFR 50.55a/IWE is augmented as follows: (4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated
C-13	II.B2.1.1-c	Penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue (Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis" for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
C-23	II.B2.1.1-d	Steel elements: Drywell head; downcomers	Steel; graphite plate	Air – indoor uncontrolled	Fretting or lockup/ mechanical wear	Chapter XI.S1, "ASME Section XI, Subsection IWE"	No

II CONTAINMENT STRUCTURES B2.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-19	II.B2.1.1-a	Steel elements: Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; ECCS suction header NOTE: Inspection of containment supports is addressed by ASME Section XI, Subsection IWF (see III.B1.3) This is essentially same as C-09, except for the structural components.	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE” For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. 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 inaccessible areas No

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-03	II.B2.2.1-b	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Aggressive environment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, "ASME Section XI, Subsection IWL". Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), of the below-grade environment is aggressive (ph < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program, Note: Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-	A plant-specific aging management program is required for inaccessible areas as stated

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						grade environment is aggressive or non-aggressive.	

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-08	II.B2.2.1-g	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program The implementation of 10 CFR 50.55a and IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. Higher temperatures than given above may be allowed in the concrete if tests and/or	Yes, if applicable.

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-06	II.B2.2.1-e	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, "Structures Monitoring Program" The initial licensing basis for some plants included a program to monitor settlement. If no settlement was evident during the first decade or so, the NRC may have given the licensee approval to discontinue the program. However, if a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-02	II.B2.2.1-a	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Water	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, "ASME Section XI, Subsection IWL" Accessible areas: Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability for to leaching of calcium hydroxide. Inaccessible Areas: A plant-specific aging management program is required for below-grade inaccessible areas (basemat and concrete wall), if the concrete is exposed to flowing water (NUREG-1557). An aging management program is not required, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	A plant-specific aging management program is required for inaccessible areas as stated

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-04	II.B2.2.1-c	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Any	Expansion and cracking/ reaction with aggregates	Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking due to reaction with aggregates. Inaccessible Areas: Evaluation is needed if testing and petrographic examinations of aggregates performed in accordance with ASTM C295-54, ASTM C227-50, or ACI 201.2R-77 (NUREG-1557) demonstrate that the aggregates are reactive.	No, if the stated conditions are satisfied for inaccessible areas

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-05	II.B2.2.1-d	Concrete: Dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, “ASME Section XI, Subsection IWL”. Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), if the below-grade environment is aggressive (ph<5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. Note: periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to demonstrate that the below-	Yes, a plant-specific aging management program is required for inaccessible areas as stated

II CONTAINMENT STRUCTURES B2.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						grade environment is aggressive or non-aggressive.	

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-07	II.B2.2.1-f	Concrete: Foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction in foundation strength, cracking, differential settlement/ erosion of porous concrete subfoundation	Chapter XI.S6, "Structures Monitoring Program" Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program
C-10	II.B2.2.3-a	Prestressing system: Tendons; anchorage components	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S2, "ASME Section XI, Subsection IWL"	No

II CONTAINMENT STRUCTURES B2.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-11	II.B2.2.3-b	Prestressing system: Tendons; anchorage components	Steel	Air – indoor uncontrolled or air - outdoor	Loss of prestress/ relaxation; shrinkage; creep; elevated temperature	Loss of tendon prestress is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.5, “Concrete Containment Tendon Prestress” for acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i) and (ii). See Chapter X.S1 of this report for meeting the requirements of 10 CFR 54.21(c)(1)(iii). For periodic monitoring of prestress, see Chapter XI.S2.	Yes, TLAA
C-23	II.B2.2.2-e	Steel elements: Drywell head; downcomers	Steel; graphite plate	Air – indoor uncontrolled	Fretting or lockup/ mechanical wear	Chapter XI.S1, “ASME Section XI, Subsection IWE”	No

II CONTAINMENT STRUCTURES B2.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-19	II.B2.2.2-a	Steel elements: Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; ECCS suction header NOTE: Inspection of containment supports is addressed by ASME Section XI, Subsection IWF (see III.B1.3) This is essentially same as C-09, except for the structural components.	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE" For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. 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 inaccessible areas No

II B2.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-20	II.B2.2.2-c	Steel elements: Torus; vent line; vent header; vent line bellows; downcomers Essentially same as C-14, except for the structural components	Stainless steel; steel	Air – indoor uncontrolled	Cracking/ cyclic loading (CLB fatigue analysis does not exist)	Chapter XI.S1 “ASME Section XI, Subsection IWE “ and Chapter XI.S4, “10 CFR Part 50, Appendix J” Evaluation of 10 CFR 50.55a/IWE is augmented as follows: (4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	Yes, detection of aging effects is to be evaluated
C-21	II.B2.2.2-d	Steel elements: Torus; vent line; vent header; vent line bellows; downcomers Essentially same as C-13, except for the structural components	Stainless steel; steel	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue (Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, “Containment Liner Plate and Penetration Fatigue Analysis” for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA

II CONTAINMENT STRUCTURES B2.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-22	II.B2.2.2-b	Steel elements: Vent line bellows Essentially same as C-15, except for the structural components and materials	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, "ASME Section XI, Subsection IWE " and Chapter XI.S4, "10 CFR Part 50, Appendix J" Evaluation of 10 CFR 50.55a/IWE is augmented as follows: (4) Detection of Aging Effects: Stress corrosion cracking (SCC) is a concern for dissimilar metal welds. In the case of bellows assemblies, SCC may cause aging effects particularly if the material is not shielded from a corrosive environment. Subsection IWE covers inspection of these items under examination categories E-B, E-F, and E-P (10 CFR Part 50, Appendix J pressure tests). 10 CFR 50.55a identifies examination categories E-B and E-F as optional during the current term of operation. For the extended period of operation, Examination Categories E-B and E-F, and additional appropriate examinations to detect SCC in bellows assemblies and dissimilar metal welds are	Yes, detection of aging effects is to be evaluated

II CONTAINMENT STRUCTURES B2.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						warranted to address this issue. (10) Operating Experience: IN 92-20 describes an instance of containment bellows cracking, resulting in loss of leak tightness.	

B3. MARK III CONTAINMENTS

B3.1 Steel Containments

B3.2 Concrete Containments

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B3. Mark III Containments

Systems, Structures, and Components

This section addresses the elements of BWR Mark III containment structures. Mark III steel containments are discussed in II.B3.1. Mark III concrete containments are discussed in II.B3.2.

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation system (V.C), and standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the NSSS components and containment internal structures.

II CONTAINMENT STRUCTURES B3.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-03	II.B3.1.2-b	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Aggressive environment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, “ASME Section XI, Subsection IWL”. Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), of the below-grade environment is aggressive (ph < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program, Note: Periodic monitoring of below-grade water chemistry (including consideration of	A plant-specific aging management program is required for inaccessible areas as stated

II B3.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						potential seasonal variations) is an acceptable approach to demonstrate that the below-grade environment is aggressive or non-aggressive.	

II CONTAINMENT STRUCTURES B3.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-08	II.B3.1.2-g	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program The implementation of 10 CFR 50.55a and IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. Higher temperatures than given above may be allowed in the	Yes, if applicable.

II B3.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	

II CONTAINMENT STRUCTURES B3.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-06	II.B3.1.2-e	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, “Structures Monitoring Program” The initial licensing basis for some plants included a program to monitor settlement. If no settlement was evident during the first decade or so, the NRC may have given the licensee approval to discontinue the program. However, if a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant’s structures monitoring program

II B3.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-02	II.B3.1.2-a	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Water	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL” Accessible areas: Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability for to leaching of calcium hydroxide. Inaccessible Areas: A plant-specific aging management program is required for below-grade inaccessible areas (basemat and concrete wall), if the concrete is exposed to flowing water (NUREG-1557). An aging management program is not required, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	A plant-specific aging management program is required for inaccessible areas as stated

II CONTAINMENT STRUCTURES B3.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-04	II.B3.1.2-c	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Any	Expansion and cracking/ reaction with aggregates	Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking due to reaction with aggregates. Inaccessible Areas: Evaluation is needed if testing and petrographic examinations of aggregates performed in accordance with ASTM C295-54, ASTM C227-50, or ACI 201.2R-77 (NUREG-1557) demonstrate that the aggregates are reactive.	No, if the stated conditions are satisfied for inaccessible areas

II CONTAINMENT STRUCTURES B3.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-05	II.B3.1.2-d	Concrete: Dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, “ASME Section XI, Subsection IWL”. Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), if the below-grade environment is aggressive (ph<5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. Note: periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to	Yes, a plant-specific aging management program is required for inaccessible areas as stated

II CONTAINMENT STRUCTURES B3.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						demonstrate that the below-grade environment is aggressive or non-aggressive.	

II B3.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-07	II.B3.1.2-f	Concrete: Foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction in foundation strength, cracking, differential settlement/ erosion of porous concrete subfoundation	Chapter XI.S6, "Structures Monitoring Program" Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program

II CONTAINMENT STRUCTURES B3.1 Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-19	II.B3.1.1-a	Steel elements: Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; ECCS suction header NOTE: Inspection of containment supports is addressed by ASME Section XI, Subsection IWF (see III.B1.3) This is essentially same as C-09, except for the structural components.	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE” For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. 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 inaccessible areas No

II B3.1	CONTAINMENT STRUCTURES Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-24	II.B3.1.1-b	Steel elements: Suppression chamber shell (interior surface)	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	No

II CONTAINMENT STRUCTURES B3.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-03	II.B3.2.1-c	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Aggressive environment	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack	Chapter XI.S2, “ASME Section XI, Subsection IWL”. Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of increase in porosity and permeability, cracking, or loss of material (spalling, scaling) due to aggressive chemical attack. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), of the below-grade environment is aggressive (ph < 5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program, Note: Periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is	A plant-specific aging management program is required for inaccessible areas as stated

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						an acceptable approach to demonstrate that the below-grade environment is aggressive or non-aggressive.	

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-08	II.B3.2.1-h	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Air – indoor uncontrolled	Reduction of strength and modulus/ elevated temperature (>150°F general; >200°F local)	Plant-specific aging management program The implementation of 10 CFR 50.55a and IWL would not be able to identify the reduction of strength and modulus due to elevated temperature. Thus, for any portions of concrete containment that exceed specified temperature limits, further evaluations are warranted. Subsection CC-3400 of ASME Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. The temperatures shall not exceed 150°F except for local areas, such as around penetrations, which are not allowed to exceed 200°F. If significant equipment loads are supported by concrete at temperatures exceeding 150°F, an evaluation of the ability to withstand the postulated design loads is to be made. Higher temperatures than given above may be allowed in the concrete if tests and/or	Yes, if applicable.

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowables.	

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

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-06	II.B3.2.1-f	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Soil	Cracks and distortion due to increased stress levels from settlement	Chapter XI.S6, "Structures Monitoring Program" The initial licensing basis for some plants included a program to monitor settlement. If no settlement was evident during the first decade or so, the NRC may have given the licensee approval to discontinue the program. However, if a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant's structures monitoring program

II CONTAINMENT STRUCTURES B3.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-02	II.B3.2.1-b	Concrete Dome; wall; basemat; ring girder; buttresses	Concrete	Water	Increase in porosity, permeability/ leaching of calcium hydroxide	Chapter XI.S2, “ASME Section XI, Subsection IWL” Accessible areas: Inspections performed in accordance with IWL will indicate the presence of increase in porosity, and permeability for to leaching of calcium hydroxide. Inaccessible Areas: A plant-specific aging management program is required for below-grade inaccessible areas (basemat and concrete wall), if the concrete is exposed to flowing water (NUREG-1557). An aging management program is not required, even if reinforced concrete is exposed to flowing water, if there is documented evidence that confirms the in-place concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	A plant-specific aging management program is required for inaccessible areas as stated

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-04	II.B3.2.1-d	Concrete: Dome; wall; basemat; ring girders; buttresses	Concrete	Any	Expansion and cracking/ reaction with aggregates	Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking due to reaction with aggregates. Inaccessible Areas: Evaluation is needed if testing and petrographic examinations of aggregates performed in accordance with ASTM C295-54, ASTM C227-50, or ACI 201.2R-77 (NUREG-1557) demonstrate that the aggregates are reactive.	No, if the stated conditions are satisfied for inaccessible areas

II CONTAINMENT STRUCTURES B3.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-05	II.B3.2.1-e	Concrete: Dome; wall; basemat; ring girders; buttresses; reinforcing steel	Concrete; steel	Air – indoor uncontrolled or air - outdoor	Cracking, loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Chapter XI.S6, “ASME Section XI, Subsection IWL”. Accessible Areas: Inspections performed in accordance with IWL will indicate the presence of cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel. Inaccessible Areas: A plant-specific aging management program is required for below-grade exterior reinforced concrete (basemat, embedded walls), if the below-grade environment is aggressive (ph<5.5, chlorides > 500ppm, or sulfates > 1,500 ppm). Examination of representative samples of below-grade concrete, when excavated for any reason, is to be included as part of a plant-specific program. Note: periodic monitoring of below-grade water chemistry (including consideration of potential seasonal variations) is an acceptable approach to	Yes, a plant-specific aging management program is required for inaccessible areas as stated

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						demonstrate that the below-grade environment is aggressive or non-aggressive.	

II CONTAINMENT STRUCTURES B3.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-07	II.B3.2.1-g	Concrete: Foundation; subfoundation	Concrete; porous concrete	Water – flowing	Reduction in foundation strength, cracking, differential settlement/ erosion of porous concrete subfoundation	Chapter XI.S6, “Structures Monitoring Program” Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	No, if within the scope of the applicant’s structures monitoring program

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-09	II.B3.2.2-a	Steel elements: Liner; liner anchors; integral attachments	Steel	Air – indoor uncontrolled or air - outdoor	Loss of material/ corrosion	Chapter XI.S1, “ASME Section XI, Subsection IWE” For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: Concrete meeting the requirements of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with IWE requirements. Borated water spills and water ponding on the containment concrete floor are not common and when detected are cleaned	Yes, if corrosion is significant for inaccessible areas

II CONTAINMENT STRUCTURES B3.2 Concrete Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						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

II B3.2	CONTAINMENT STRUCTURES Concrete Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-24	II.B3.2.2-b	Steel elements: Suppression chamber shell (interior surface)	Stainless steel	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, “ASME Section XI, Subsection IWE” and Chapter XI.S4, “10 CFR Part 50, Appendix J”	No

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B4. COMMON COMPONENTS

Systems, Structures, and Components

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

System Interfaces

Functional interfaces include the primary containment heating and ventilation system (VII.F3), containment isolation system (V.C), and standby gas treatment system (V.B). Physical interfaces exist with any structure, system, or component that either penetrates the containment wall, such as the main steam system (VIII.B2) and feedwater system (VIII.D2), or is supported by the containment structure. The containment structure basemat may provide support to the NSSS components and containment internal structures.

II CONTAINMENT STRUCTURES B4 Common Components							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-12	II.B4.1-a	Penetration sleeves	Steel; dissimilar metal welds	Air – indoor uncontrolled or air outdoor	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
C-15	II.B4.1-d	Penetration sleeves; penetration bellows	Stainless steel; dissimilar metal welds	Air – indoor uncontrolled	Cracking/ stress corrosion cracking	Chapter XI.S1, "ASME Section XI, Subsection IWE" and Chapter XI.S4, "10 CFR Part 50, Appendix J" Evaluation of 10 CFR 50.55a/IWE is augmented as follows: (4) Detection of Aging Effects: Stress corrosion cracking (SCC) is a concern for dissimilar metal	Yes, detection of aging effects is to be evaluated

II B4	CONTAINMENT STRUCTURES Common Components						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						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.	
C-14	II.B4.1-c	Penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled	Cracking/ cyclic loading (CLB fatigue analysis does not exist)	Chapter XI.S1 “ASME Section XI, Subsection IWE ” and Chapter XI.S4, “10 CFR Part 50, Appendix J” Evaluation of 10 CFR 50.55a/IWE is	Yes, detection of aging effects is to be evaluated

II CONTAINMENT STRUCTURES B4 Common Components							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
						augmented as follows: (4) Detection of Aging Effects: VT-3 visual inspection may not detect fine cracks.	
C-13	II.B4.1-b	Penetration sleeves; penetration bellows	Steel; stainless steel; dissimilar metal welds	Air – indoor uncontrolled	Cumulative fatigue damage/ fatigue (Only if CLB fatigue analysis exists)	Fatigue is a time-limited aging analysis (TLAA) to be evaluated for the period of extended operation. See the Standard Review Plan, Section 4.6, "Containment Liner Plate and Penetration Fatigue Analysis" for acceptable methods for meeting the requirements of 10 CFR 54.21(c).	Yes, TLAA
C-16	II.B4.2-a	Personnel airlock; equipment hatch	Steel	Air – indoor uncontrolled	Loss of material/ corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE," Chapter XI.S4, "10 CFR Part 50, Appendix J," and If a coatings program is credited for managing loss of material due to corrosion during the current licensing term (e.g., relief request from IWE), then it is to be continued during the period of extended operation. See Chapter XI.S8, "Protective Coating Monitoring and Maintenance Program."	No No No

II B4	CONTAINMENT STRUCTURES Common Components						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
C-17	II.B4.2-b	Personnel airlock; equipment hatch: Locks, hinges, and closure mechanisms	Steel	Air – indoor uncontrolled or air outdoor	Loss of leak tightness/ mechanical wear of locks, hinges and closure mechanisms	Chapter XI.S4, “10 CFR Part 50, Appendix J” and Plant Technical Specifications	No
C-18	II.B4.3-a	Seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Seals, elastomers, rubber and other similar materials	Air – indoor uncontrolled or air outdoor	Loss of sealing; leakage through containment/ deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Chapter XI.S1, “ASME Section XI, Subsection IWE” Leak tightness will be monitored by 10 CFR Part 50, Appendix J Leak Rate Tests for pressure boundary, seals and gaskets (including O-rings).	No