NUCLEAR ENERGY INSTITUTE

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May 15, 2000

Mr. Christopher I. Grimes
Chief, License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Generic Aging Lessons Learned Report Comments

PROJECT NUMBER: 690

Dear Mr. Grimes:

Enclosed are comments on Generic Aging Lessons Learned (GALL) Report Chapter II, Sections A2 and A3. The enclosure includes three documents. One document is a mark-up of the existing GALL pages to reflect our comments. Each comment is identified by number. The second document is a table containing our comments, numbered consistent with the marked-up pages. The third document is a clean copy of the GALL pages to reflect how GALL reads with our comments incorporated.

Please note that in previous comments we suggested creating a new Chapter XI in GALL as a repository for the program evaluations. Having such a chapter allows the various GALL sections to merely reference the new chapter when a program is credited. In the enclosed comments we have followed this recommendation. Also in our previous comments we recommended removing Time Limited Aging Analyses (TLAA) from GALL and moving them to the License Renewal Standard Review Plan. As a minimum, we recommend the creation of a new chapter in GALL as a repository for TLAAs. The TLAAs in section IIA2 and IIA3 are identified but have not moved to a new chapter pending a decision by the NRC staff relative to our recommendation.

We look forward to discussing the enclosed comments with the NRC staff. Please contact me to establish a meeting date.

Sincerely,

Doug Walters

Douglas J. Walters

Enclosures

c: Mr. Sam Lee
Mr. P.T. Kuo

D042

A2. Steel Containments

A2.1 Steel Elements
A2.2 Concrete Elements

A2. Steel Containments

Systems, Structures, and Components

Review Table II A addresses the elements of PWR containment structures. Reinforced and prestressed concrete containments, steel containments, and common components are discussed separately under subheadings A1, A2, and A3, respectively. This format follows the presentation format in Section 3.3 of the draft Standard Review Plan for License Renewal (SRP-LR). Steel containments in Review Table II A2 are divided into two elements: steel and concrete.

System Interfaces

Functional interfaces include the primary containment HVAC system(VII.I), containment isolation system(V.A), containment spray system(V.B), and containment heat removal system(V.C). Physical interfaces exist with any structure, system, or component which either penetrates the containment wall, such as the main steam system(VIII.A) and feedwater systems(VIII.F,VIII.G), or is supported by the containment structure, such as the polar crane(VII.K.7). The containment structure basemat typically provides support to the NSSS components and containment internal structures.

Containment HVAC system (VII F3)
Containment Isolation system (VC)
Containment Spray System (VA)
Containment Heat Removal System (V.D1)
Main steam system (VIII B1)
Feedwater System (VIII D1)
Polar Crane (VII B2)

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II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A2.1	Steel Elements	Contain-ment Shell: Dome, Wall, Embedded Floor	Carbon Steel	Inside and/or Outside Contain-ment	Loss of Material	Corrosion	*Same as A1.2, Corrosion Aging Mechanism*
~~A2.1~~	~~Steel~~ Elements	~~Contain-ment Shell: Dome, Wall, Embedded Floor~~	~~Carbon Steel~~	~~Inside and/or Outside Contain-ment~~	~~Crack Initiation and Growth~~	~~Stress Corrosion Cracking~~	~~*Same as A1.2, Stress Corrosion Cracking Aging Mechanism*~~

DELETE ROW - SEE COMMENT #323

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
~~Same as A1.2, Corrosion Aging Mechanism~~ 10CFR50.55a/ASME Section XI, Subsection IWE 65	~~Same as A1.2, Corrosion Aging Mechanism~~ See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWE.	~~Same as A1.2, Corrosion Aging Mechanism~~ No 65
~~Same as A1.2, Stress Corrosion Cracking Aging Mechanism~~	~~This aging effect is not significant for the containment shell itself. See Item A3.1.~~ 323	~~No.~~

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-~~ment~~ ~~Inside and/or~~ Outside Contain-ment	Aging ~~Effect~~ ~~Scaling;~~ Cracking, ~~Spalling~~ Loss of material	Aging Mechanism	References
A2.2	Concrete Elements	Basemat	Concrete	225	62	Freeze/ Thaw	*Same as A1.1, Freeze/Thaw Aging Mechanism*
A2.2	Concrete Elements	Basemat	Concrete	Inside and/or Outside Contain-ment	Increase in Porosity, Permea-bility; ~~Scaling;~~ Cracking, ~~Spalling~~ Loss of material 62	Leaching of Calcium Hydroxide; Aggressive Chemical Attack	*Same as A1.1, Leaching of Calcium Hydroxide; Aggressive Chemical Attack Aging Mechanism*

II. CONTAINMENT STRUCTURES
A. PWR Containments
A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
~~Same as A1.1, Freeze/Thaw Aging Mechanism~~ 10CFR50.55a/ASME Section XI, Subsection IWL	~~Same as A1.1, Freeze/Thaw Aging Mechanism~~ See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL 65	~~Same as A1.1, Freeze/Thaw Aging Mechanism~~ NO
~~Same as A1.1, Leaching of Calcium Hydroxide, Aggressive Chemical Attack Aging Mechanism~~ INSERT SAME LANGUAGE HERE AND HERE	~~Same as A1.1, Leaching of Calcium Hydroxide, Aggresstive Chemical Attack Aging Mechanism~~	~~Same as A1.1, Leaching of Calcium Hydroxide, Aggressive Chemical Attack Aging Mechanism~~ NO

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A2.2	Concrete Elements	Basemat	Concrete	Inside and/or Outside Contain-ment	Expansion & Cracking	Reaction with Aggregates	*Same as A1.1, Reaction with Aggregates Aging Mechanism*
A2.2	Concrete Elements	Basemat and Reinforcing Steel	Concrete; Carbon Steel	Inside and/or Outside Contain-ment	Cracking, Spalling, Loss of Bond, Loss of Material	Corrosion of Embedded Steel	*Same as A1.1, Corrosion of Embedded Steel Aging Mechanism*

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
~~*Same as A1.1, Reaction with Aggregates Aging Mechanism*~~ 10CFR50.55a/ASME Section XI, Subsection IWL	~~*Same as A1.1, Reaction with Aggregates Aging Mechanism*~~ See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL 65	~~*Same as A1.1, Reaction with Aggregates Aging Mechanism*~~ No
Same as A1.1, Corrosion of Embedded Steel Aging Mechanism INSERT HERE AND →	*Same as A1.1, Corrosion of Embedded Steel Aging Mechanism* → HERE	~~*Same as A1.1, Corrosion of Embedded Steel Aging Mechanism*~~ No

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A2.2	Concrete Elements	Basemat	Concrete	Inside and/or Outside Contain-ment	Cracks; Distortion; Increase in Compo-nent Stress Level	Settlement	*Same as A1.1, Settlement Aging Mechanism*
~~A2.2~~	~~Concrete Elements~~	~~Basemat~~	~~Concrete, Carbon Steel~~	~~Inside and/or Outside Contain-ment~~	~~Loss of Strength and Modulus~~	~~Elevated~~ Tempera-ture	~~*Same as A1.1, Elevated Temperature Aging Mechanism*~~

DELETE ROW → SEE COMMENT # 324

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
~~Same as A1.1, Settlement Aging Mechanism~~ 10CFR50.55a/ASME Section XI, Subsection IWL	~~Same as A1.1, Settlement Aging Mechanism~~ See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL	~~Same as A1.1, Settlement Aging Mechanism~~ No
~~Same as A1.1, Elevated Temperature Aging Mechanism~~ DELETE	~~Same as A1.1, Elevated Temperature Aging Mechanism~~ ROW - SEE COMMENT # 324	~~Same as A1.1, Elevated Temperature Aging Mechanism~~

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A3. Common Components

A3.1 Penetration Sleeves, Penetration Bellows, Dissimilar Metal Welds
A3.2 Personnel Airlock, Equipment Hatch
A3.3 Subfoundation Layer
A3.4 Seals and Gaskets

A3. Common Components

Systems, Structures, and Components

Review Table II A addresses the elements of PWR containment structures. Reinforced and prestressed concrete containments, steel containments, and common components are discussed separately under subheadings A1, A2, and A3, respectively. This format follows the presentation format in Section 3.3 of the draft Standard Review Plan for License Renewal (SRP-LR). Common components in Review Table II A3 include penetation sleeves and bellows; dissimilar metal welds; personnel airlock; equipment hatch; subfoundation layer; and seals/gaskets.

System Interfaces

Functional interfaces include the primary containment HVAC system(VII.I), containment isolation system(V.A), containment spray system(V.B), and containment heat removal system(V.C). Physical interfaces exist with any structure, system, or component which either penetrates the containment wall, such as the main steam system(VIII.A) and feedwater systems(VIII.F,VIII.G), or is supported by the containment structure, such as the polar crane(VII.K.7). The containment structure basemat typically provides support to the NSSS components and containment internal structures.

Containment HVAC (VII F3)
Containment Isolation (VC)
Containment Heat Removal (V.D1)
Main steam (VIII B1)
Feedwater (VIII D1)
Polar crane (VII B2)

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II. CONTAINMENT STRUCTURES

A. PWR Containments

A3. Common Components

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.1	---	Penetration Sleeves, Penetration Bellows, ~~Dissimilar Metal Welds~~ E66	Carbon Steel	Inside and/or Outside Contain-ment	Loss of Material	Corrosion	*Same as A1.2, Corrosion Aging Mechanism*
A3.1	---	Penetration Sleeves, Penetration Bellows, ~~Dissimilar Metal Welds~~ E66	Carbon Steel, Stainless Steel	Inside and/or Outside Contain-ment	Cumula-tive Fatigue Damage	Cyclic Loading	NUREG-1611

II. CONTAINMENT STRUCTURES
A. PWR Containments
A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
~~Same as A1.2, Corrosion Aging Mechanism~~ 10CFR50.55a/ASME Section XI, Subsection IWE	~~Same as A1.2, Corrosion Aging Mechanism~~ See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWE 65	~~Same as A1.2, Corrosion Aging Mechanism~~ NO
~~NUREG 1611 identifies the need for TLAA to account for the additional number of load cycles associated with the period of extended operation.~~ 10CFR50, Appendix J if no specific fatigue design basis exists. 350	~~10 CFR 50.55a, IWE, and 10 CFR 50, Appendix J do not address cumulative fatigue damage. A time-limited aging analysis (TLAA) is required for the extended period of plant operation.~~ ~~Current licensing basis fatigue analyses, per ASME Code, Section III, were conducted for a 40 year life. These must be updated to account for the period of extended operation. All cyclic loadings considered in the original fatigue analyses (including Type A and Type B leak rate tests) must be reevaluated and revised as necessary. The revised Cumulative Fatigue Usage Factor must not exceed 1.0.~~ INSERT LANGUAGE FROM COMMENT #350	~~Yes.~~ TLAA must be evaluated. NO - for App. J

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II. CONTAINMENT STRUCTURES

A. ~~PWR Containments~~

A3. ~~Common Components~~

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.1	---	~~Penetration Sleeves,~~ Penetration Bellows, ~~Dissimilar Metal Welds~~	~~Carbon Steel,~~ Stainless Steel	Inside and/or Outside Contain-ment	Crack Initiation and Growth	Stress Corrosion Cracking	*Same as A1.2, Stress Corrosion Cracking Aging Mechanism* NRC IN 92-20
A3.1		Penetration Sleeves	Carbon Steel			Corrosion	10CFR50.55a ASME Section XI, Subsection IWE
A3.2	---	Personnel Airlock, Equipment Hatch	Carbon Steel	Inside and/or Outside Contain-ment	Loss of Material	Corrosion	10CFR50.55a ASME Section XI, Subsection IWE 10CFR50, Appendix J NUREG-1611

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See Chapter XI for an evaluation of ASME Section XI, Subsection IWE, and an evaluation of 10CFR50, Appendix J

II. CONTAINMENT STRUCTURES
A. PWR Containments
A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
~~Same as A1.2, Stress Corrosion Cracking Aging Mechanism~~ ~~IN 92-20 describes an instance of containment bellows cracking, resulting in loss of leak tightness.~~ 10CFR50 Appendix J 10CFR 50.55a ASME Section XI, Subsection IWE	~~Previous evaluation of 10 CFR 50.55a, IWE is augmented as follows:~~ ~~(3) Parameters Monitored or Inspected:~~ ~~Stress corrosion cracking (SCC) is a concern wherever~~ dissimilar welds are used and in the case of bellows assemblies if the material is not shielded from a corrosive environment. IWE covers these items under examination categories E-F and E-B. 10 CFR 50.55a identifies examination of these categories as optional during the current term of operation. If plant-specific operating experience indicates a current or potential problem with leak tightness of containment bellows, then Examination Categories E-F and E-B, and augmented VT-1 visual examinations of bellows bodies ~~is warranted to address this issue.~~	~~Yes.~~ Plant-specific operating experience with cracking of containment bellows ~~should be evaluated~~. NO
10CFR50.55a/ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ ASME Section XI, Subsection IWE	No
Codes and Standards (10CFR50.55a), ASME Section XI, Subsection IWE	Aging effect will be managed by IWE. Leak tightness will be monitored by Appendix J Leak Rate Tests.	No.

II. CONTAINMENT STRUCTURES
A. PWR Containments
A3. Common Components

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.2	---	Personnel Airlock, Equipment Hatch	Carbon Steel	Inside and/or Outside Contain-ment	Fretting/ Lockup	Mechanical Wear of Locks/ Hinges and Closure Mechanisms Required To Keep THE HATCH/Airlock IN THE CLOSED POSITION 374	10CFR50.55a ASME Section XI, Subsection IWE 10CFR50, Appendix J
~~A3.3~~	---	~~Subfounda-tion Layer~~	~~Porous Concrete~~ 353	~~Under-ground~~	~~Reduction in Founda-tion Strength~~	~~Erosion of Porous Concrete Subfounda-tion~~	~~NUREG-1611~~ ~~NRC IN 97-11~~ ~~NRC IN 98-26~~

II. CONTAINMENT STRUCTURES

A. PWR Containments

A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
~~Codes and Standards (10CFR50.55a)~~ ASME Section XI, Subsection IWE	~~Aging effect will be managed by IWE.~~ See Chapter XI for an evaluation of ASME Section XI, subsection IWE	No.
~~No specific Aging Management Program exists. NUREG-1611 identifies erosion of porous concrete subfoundation as a potential aging mechanism.~~	~~Erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 identifies Maintenance Rule Structures Monitoring for managing this aging effect, if applicable. (See Chapter III.A, Class 1 Structures for evaluation of Maintenance Rule Structures Monitoring)~~	~~Yes.~~ ~~If applicable, plant-specific evaluation is required.~~

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II. CONTAINMENT STRUCTURES

A. PWR Containments

A3. Common Components

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.4	---	Seals & Gaskets Moisture barrier, caulking and Flashing E26!	Various	Inside and/or Outside Contain-ment	Loss of Sealing; Leakage Through Contain-ment	Deteriora-tion of Joint Sealants, Gaskets, O-rings	10CFR50.55a ASME Section XI, Subsection IWE 10CFR50, Appendix J

II. CONTAINMENT STRUCTURES
A. PWR Containments
A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
Codes and Standards (10CFR50.55a), ASME Section XI, Subsection IWE	Aging effect will be managed by IWE. Leak tightness will be monitored by Appendix J Leak Rate Tests. ADD: FOR PRESSURE BOUNDARY SEALS, GASKETS AND O-RINGS 261	No.

GALL REPORT-CIVIL/STRUCTURAL COMMENTS
Sections II A2 and II A3

Comment Number	GALL Section	ITEM NO.	Page	COMMENT
63	A2 and A3	Sys. Interface	II A2-3 II A3-3	System Interfaces Section, the references to interfaces do not match the GALL Table of Contents sections. The references should be changed to the following: Containment HVAC system (VII.F3), containment isolation system (V.C), containment spray system (V.A), and containment heat removal system (V.D1), main steam system (VIII.B1), feedwater system (VIII.D1), and polar crane (VII.B2).
323	A2	A2.1	II A2-4	Stress corrosion cracking of carbon steel liners should not be included in the report. Eliminate the row. BASIS: Carbon and low-alloy steels are not subject to stress corrosion cracking in containment environments, with the exception of high-strength bolts (yield strength greater than 150 ksi) under caustic conditions.
65	A2	A2.1	IIA2-5	GENERIC COMMENT: Whenever the text refers back to a previous section insert the wording from that section. In many cases, reference is made to Section IIA1.2. NEI provided comments on this section in a letter dated May 1, 2000. For consistency, whenever the existing program is 10CFR50.55a/ASME IWE or IWL, we direct the reader to the new proposed GALL Chapter XI. This Chapter contains the existing program evaluations.
62	A2	A2.2	II A2-6	Aging effects should be Loss of Material. Makes this sections consistent with II A1.
225	A2	A2.2	II A2-6	The environment should only include "Outside Containment." BASIS: Freeze-thaw is only applicable for those components exposed to the external environment.
324	A2	A2.2	II A2-10	Delete the A2.2 row. BASIS: The reinforced concrete basemat is not subject to temperatures that exceed the general and local temperature limits.
66	A3	A3.1	IIA3-4 II A3-6	Delete the dissimilar metal welds from the Region of Interest for A3.1 corrosion. BASIS: 10 CFR 50.55a(b)(x)(C) states that the examination of these items is optional.
350	A3	A3.1	II A3-5	In the Aging Management Program column, delete the reference to NUREG-1611 as the basis for the TLAA for load cycles. Insert the following in the Evaluation and Technical Basis column:

GALL REPORT-CIVIL/STRUCTURAL COMMENTS
Sections II A2 and II A3

				For those plants with penetration sleeves or penetration bellows that have an explicit fatigue design basis, that fatigue design basis represents a TLAA. For plants whose penetration sleeves or penetration bellows do not have an explicit fatigue design basis, no TLAA evaluation is required. In such a case, potential crack initiation and growth from cyclic operation is managed by Appendix J,Type A and Type B integrated leak rate testing as supplemented by inservice inspection performed in accordance with ASME Section XI, Subsection IWE. See Chapter XI for an evaluation of ASME Section XI, Subsection IWE and an evaluation of 10CFR50, Appendix J.
258	A3	A3.1	II A3-6	This item should be split into two separate items. One item is Penetration Sleeves made of carbon steel with an aging mechanism of corrosion. This item is managed by 10CFR50.55a/ASME Section I, Subsection IWE. The second item is Penetration Bellows made of stainless steel with an aging mechanism of stress corrosion cracking. This item is managed by 10 CFR 50, Appendix J and supplemented by ASME Section XI, Subsection IWE.
352	A3	A3.2	II A3-6	Delete reference to NUREG-1611.
379	A3	A3.2	II A3-8	Reword the Aging Mechanism column to read as follows: "Mechanical Wear of Locks, Hinges and Closure Mechanisms required to maintain the airlock/hatch in the closed position". BASIS: Should only evaluate the components required to maintain the hatch in the closed position support the intended function (containment integrity).
353	A3	A3.3	II A3-8	Delete the entire A3.3 row. BASIS: The Existing Aging Management Program column and the Evaluation and Technical basis column reference conditions of concrete erosion in NUREG-1611, IN 97-11 and IN 98-26; however no specific aging management program is identified.
261	A3	A3.4	II A3-10	The Region Of Interest column should include "Moisture Barrier, Caulking, Flashing" BASIS: Consistency with the terms of IWE. The statement in the Evaluation and Technical Basis column regarding leak tightness applies only to pressure boundary seals, gaskets and O-Rings. The moisture barriers and caulking have only a sealing function to protect the embedded steel shell.

A2. Steel Containments

A2.1 Steel Elements
A2.2 Concrete Elements

A2. Steel Containments

Systems, Structures, and Components

Review Table II A addresses the elements of PWR containment structures. Reinforced and prestressed concrete containments, steel containments, and common components are discussed separately under subheadings A1, A2, and A3, respectively. This format follows the presentation format in Section 3.3 of the draft Standard Review Plan for License Renewal (SRP-LR). Steel containments in Review Table II A2 are divided into two elements: steel and concrete.

System Interfaces

Functional interfaces include the primary containment HVAC system(VII.F3), containment isolation system(V.C), containment spray system(V.A), and containment heat removal system(V.D1). Physical interfaces exist with any structure, system, or component which either penetrates the containment wall, such as the main steam system(VIII.A) and feedwater systems(VIII.D1), or is supported by the containment structure, such as the polar crane(VII.B2). The containment structure basemat typically provides support to the NSSS components and containment internal structures.

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A2.1	Steel Elements	Contain-ment Shell: Dome, Wall, Embedded Floor	Carbon Steel	Inside and/or Outside Contain-ment	Loss of Material	Corrosion	*Same as A1.2, Corrosion Aging Mechanism*

II. CONTAINMENT STRUCTURES
A. PWR Containments
A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50.55a/ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWE	No

II. CONTAINMENT STRUCTURES
A. PWR Containments
A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A2.2	Concrete Elements	Basemat	Concrete	Outside Contain-ment	Cracking, Loss of Material	Freeze/ Thaw	*Same as A1.1, Freeze/Thaw Aging Mechanism*
A2.2	Concrete Elements	Basemat	Concrete	Inside and/or Outside Contain-ment	Increase in Porosity, Permea-bility; Cracking, Loss of Material	Leaching of Calcium Hydroxide; Aggressive Chemical Attack	*Same as A1.1, Leaching of Calcium Hydroxide; Aggressive Chemical Attack Aging Mechanism*

II. CONTAINMENT STRUCTURES
A. PWR Containments
A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50.55a/ASME Section XI, Subsection IWL	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL	No
10CFR50.55a/ASME Section XI, Subsection IWL	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL	No

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A2.2	Concrete Elements	Basemat	Concrete	Inside and/or Outside Contain-ment	Expansion & Cracking	Reaction with Aggregates	*Same as A1.1, Reaction with Aggregates Aging Mechanism*
A2.2	Concrete Elements	Basemat and Reinforcing Steel	Concrete; Carbon Steel	Inside and/or Outside Contain-ment	Cracking, Spalling, Loss of Bond, Loss of Material	Corrosion of Embedded Steel	*Same as A1.1, Corrosion of Embedded Steel Aging Mechanism*

II. CONTAINMENT STRUCTURES
A. PWR Containments
A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50.55a/ASME Section XI, Subsection IWL	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL	No
10CFR50.55a/ASME Section XI, Subsection IWL	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL	No

II. CONTAINMENT STRUCTURES

A. PWR Containments

A2. Steel Containments

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A2.2	Concrete Elements	Basemat	Concrete	Inside and/or Outside Contain-ment	Cracks; Distortion; Increase in Compo-nent Stress Level	Settlement	*Same as A1.1, Settlement Aging Mechanism*

II. CONTAINMENT STRUCTURES
A. PWR Containments
A2. Steel Containments

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50.55a/ASME Section XI, Subsection IWL	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWL	No

A3. Common Components

A3.1 Penetration Sleeves, Penetration Bellows, Dissimilar Metal Welds
A3.2 Personnel Airlock, Equipment Hatch
A3.3 Subfoundation Layer
A3.4 Seals and Gaskets

A3. Common Components

Systems, Structures, and Components

Review Table II A addresses the elements of PWR containment structures. Reinforced and prestressed concrete containments, steel containments, and common components are discussed separately under subheadings A1, A2, and A3, respectively. This format follows the presentation format in Section 3.3 of the draft Standard Review Plan for License Renewal (SRP-LR). Common components in Review Table II A3 include penetation sleeves and bellows; dissimilar metal welds; personnel airlock; equipment hatch; subfoundation layer; and seals/gaskets.

System Interfaces

Functional interfaces include the primary containment HVAC system(VII.F3), containment isolation system(V.C), containment spray system(V.D), and containment heat removal system(V.D1). Physical interfaces exist with any structure, system, or component which either penetrates the containment wall, such as the main steam system(VIII.B1) and feedwater systems(VIII.D1), or is supported by the containment structure, such as the polar crane(VII.B2). The containment structure basemat typically provides support to the NSSS components and containment internal structures.

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.1	---	Penetration Sleeves, Penetration Bellows	Carbon Steel	Inside and/or Outside Contain-ment	Loss of Material	Corrosion	*Same as A1.2, Corrosion Aging Mechanism*
A3.1	---	Penetration Sleeves, Penetration Bellows	Carbon Steel, Stainless Steel	Inside and/or Outside Contain-ment	Cumula-tive Fatigue Damage	Cyclic Loading	NUREG-1611

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50.55a/ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWE	No
10CFR50, Appendix J if no specific fatigue design basis exists.	For those plants with penetration sleeves or penetration bellows that have an explicit fatigue design basis, that fatigue design basis represents a TLAA. For plants whose penetration sleeves or penetration bellows do not have an explicit fatigue design basis, no TLAA evaluation is required. In such a case, potential crack initiation and growth from cyclic operation is managed by Appendix J, Type A and Type B integrated leak rate testing as supplemented by inservice inspection performed in accordance with ASME Section XI, Subsection IWE. See Chapter XI for an evaluation of ASME Section XI, Subsection IWE and an evaluation of 10 CFR50, Appendix J.	TLAA must be evaluated. No for Appendix J.

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.1	---	Penetration Bellows	Stainless Steel	Inside and/or Outside Contain-ment	Crack Initiation and Growth	Stress Corrosion Cracking	*Same as A1.2, Stress Corrosion Cracking Aging Mechanism* NRC IN 92-20
A3.1		Penetration Sleeves	Carbon Steel			Corrosion	10CFR50.55a ASME Section XI, Subsection IWE
A3.2	---	Personnel Airlock, Equipment Hatch	Carbon Steel	Inside and/or Outside Contain-ment	Loss of Material	Corrosion	10CFR50.55a ASME Section XI, Subsection IWE 10CFR50, Appendix J NUREG-1611

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50, Appendix J 10CFR50.55a/ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWE and an evaluation of 10CFR50, Appendix J.	No
10CFR50.55a/ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWE	No
10CFR50.55a/ ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ASME Section XI, Subsection IWE Leak tightness will be monitored by Appendix J Leak Rate Tests.	No.

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.2	---	Personnel Airlock, Equipment Hatch	Carbon Steel	Inside and/or Outside Contain-ment	Fretting/ Lockup	Mechanical Wear of Locks/ Hinges and Closure Mechanisms required to keep the hatch/airlock in the closed position	10CFR50.55a ASME Section XI, Subsection IWE 10CFR50, Appendix J

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50.55a/ ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ ASME Section XI, Subsection IWE	No.

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Item	Structure/ Component	Region of Interest	Material	Environ-ment	Aging Effect	Aging Mechanism	References
A3.4	---	Seals Gaskets, Moisture barrier, caulking, and flashing	Various	Inside and/or Outside Contain-ment	Loss of Sealing; Leakage Through Contain-ment	Deteriora-tion of Joint Sealants, Gaskets, O-rings	10CFR50.55a ASME Section XI, Subsection IWE 10CFR50, Appendix J

II. CONTAINMENT STRUCTURES
B. PWR Containments
A3. Common Components

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
10CFR50.55a/ASME Section XI, Subsection IWE	See Chapter XI for an evaluation of 10CFR50.55a/ ASME Section XI, Subsection IWE Leak tightness will be monitored by Appendix J Leak Rate Tests for pressure boundary, seals, gaskets and o-rings,	No.

CHAPTER XI

EXISTING AGING MANAGEMENT PROGRAMS (AMP) AND ACTIVITIES

NEI Draft
May 8, 2000

Existing Aging Management Programs (AMP) and Activities

A.1	Aging Management Program for Electrical Cables and Connections Exposed to an Adverse Localized Environment Caused by Heat or Radiation
A.2	Aging Management Program for Electrical Cables Used in Instrumentation Circuits that are Sensitive to Reduction in Conductor Insulation Resistance (IR) Exposed to an Adverse Localized Environment Caused by Heat or Radiation
A.3	Aging Management Program for Inaccessible Medium-Voltage Cables Exposed to an Adverse Localized Environment Caused by Moisture and Voltage Exposure
A.4	Borated Water Leakage Surveillance Program for Electrical Connectors
A.5	ASME Section XI, Subsection IWE
A.6	ASME Section XI, Subsection IWL
A.7	10CFR50, Appendix J
A.8	Inservice Inspection Program
A.9	Closed Cooling Water Chemistry Program
A.10	Flow Accelerated Corrosion program
A.11	Fire Water System Aging Management Program
A.12	Fuel Oil Chemistry Program
A.13	Boric Acid Corrosion Program
A.14	Generic Letter 89-13 Program
A.15	Primary Water Chemistry Program
A.16	Secondary Water Chemistry Program

A.7

10CFR50, Appendix J

DESCRIPTION

Currently there are two options, Option A and Option B, either of which meet the requirements of the containment LRT program. Under Option A, all of the testing must be performed on a periodic interval. Option B is a performance-based approach, which eliminates the prescriptive requirements that are marginal to safety. Some of the differences between these options are discussed below and more detailed information for Option B is provided in NRC Regulatory Guide 1.163 and NEI 94-01, Rev. 0

EVALUATION AND TECHNICAL BASIS

1) ***Scope of Program:*** The scope of the containment LRT program must include all pressure retaining passive components. Two types of tests shall be implemented. Type A tests are performed to measure leakage rates through all potential leakage paths including containment welds, valves, fittings, and components, which penetrate containment. Type B tests are performed to measure local leakage rates across each pressure containing or leakage limiting boundary for containment penetrations. Type A and Type B tests defined in 10 CFR 50, Appendix J are acceptable methods for performing these leak rate tests. Leakage testing for isolation valves (normally performed under Type C tests), if not included under this program, should be included under leakage rate test programs for systems containing the isolation valves.
2) ***Preventive Actions:*** Since the containment LRT program is a monitoring program, no preventive actions are needed.
3) ***Parameters Monitored:*** The parameters to be monitored are leakage rates through containment liner/welds, penetrations, fittings, and other access openings.
4) ***Detection of Aging Effects:*** A containment LRT program is effective in detecting degradation which compromises the containment pressure boundary, including seals and gaskets. While the calculation of leakage rates demonstrates the leak-tightness and structural integrity of the containment, it does not by itself provide information, which would indicate that aging degradation has initiated, or that the capacity of the containment may have been reduced for other types of loads such as seismic. This would be achieved with the additional implementation of an acceptable containment inservice inspection program as described earlier.
5) ***Monitoring and Trending:*** Since the LRT program must be repeated throughout the operating license period, the entire pressure boundary is being monitored over time. The frequency of these tests depends on which option (A or B) is selected. With Option A, testing is performed on a regular fixed time interval as defined in 10 CFR 50, Appendix J. In the case of Option B, the period for testing may be extended based on acceptable performance of meeting leakage limits on prior tests. Additional details for implementing Option B are provided in NRC R.G. 1.163 and NEI 94-01, Rev.0.
6) ***Acceptance Criteria:*** Acceptance criteria for leakage rates are defined in the plant technical specifications. Acceptance criteria are acceptable if they meet the requirements in 10 CFR 50, Appendix J.
7) ***Corrective Actions:*** When leakage rates do not meet the acceptance criteria, corrective actions are taken in accordance with 10 CFR 50, Appendix J and NEI 94-01. If results are not acceptable, then an evaluation is required to identify the cause of the unacceptable performance and appropriate corrective actions must be taken.
8) ***Confirmation Process:*** When corrective actions are implemented to repair the condition causing the excessive leakage, confirmation by additional leak rate testing is required to confirm that the deficiency has been corrected.
9) ***Administrative Controls:*** Results of the LRT program must be documented as described in 10 CFR 50, Appendix J to demonstrate that the acceptance criteria for leakage have been satisfied. The records are required to be available for inspection at the plant site. Test results

that exceed the performance criteria must be assessed under 10 CFR 50.72 and 10 CFR 50.73. The quality assurance for corrective actions, confirmation process, and administrative control shall be in accordance with the plant's Quality Assurance Program.

10) ***Operating Experience:*** The plant-specific operating experience should be reviewed to ensure that the containment LRT program is effective in preventing unacceptable leakage through the containment pressure boundary. The requirements for Option B of 10 CFR 50, Appendix J should ensure that the test frequency is based on plant-specific operating experience.