NUCLEAR ENERGY INSTITUTE

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July 11, 2001

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

SUBJECT: Response to Request for Additional Information for the Review of the Nuclear Energy Institute Demonstration Project, Plant X and Plant Y

PROJECT NUMBER: 690

Dear Mr. Grimes:

On June 20, 2001, the industry participated in a conference call with the NRC staff to discuss preliminary reviews of the Plant X and Y demonstration project. As a follow-up, on June 27, 2001 the NRC forwarded a "Request for Additional Information for the Review of the Nuclear Energy Institute Demonstration Project, Plant X and Plant Y."

The purpose of the project is to determine which approach optimizes the time to prepare an application and results in the most efficient NRC staff review. One of the out comes of this project has been the identification of a number of process questions that will be discussed at a public meeting on July 25, 2001. As a result of our continued review of the demonstration project a number of additional process questions may arise.

Attached for your review are responses to the RAIs for Plant X and Plant Y. These responses should support the development of the safety evaluations. Note that Plant X has identified in "bold"additional process questions. We look forward to addressing these questions as well on July 25, 2001.

Add: S. Mitra to ericb
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We look forward to meeting with the NRC staff on July 25, 2001. If you have any questions, please call me at (202) 739-8110.

Sincerely,

Alan Nelson

c: S.K. Mitra

Enclosures

Response to Request for Additional Information For the Review of the Nuclear Energy Institute Demonstration Project

Plant X Demonstrates the Use of GALL in an Application that Follows the Standard Review Plan

July 11, 2001

RAIs FOR PLANT X
SECTION 3.4: STEAM AND POWER CONVERSION SYSTEMS

1. Table 3.4.2 of the LRA contains the results of the aging management review for component or aging effects that are not addressed in the GALL report. Table 3.4.2 indicates that stainless steel pipes, fittings, and valves in saturated steam are susceptible to cracking. However, the application indicates that all other materials and environment conditions specified in Table 3.4.2 are not susceptible to cracking. Identify the site operating experiences, including maintenance and inspection, that indicates these components are not susceptible to cracking.

Response: *The review of site specific operating experience conducted in preparing this application identified no operating experience to show these components are susceptible to cracking. A search of Volume II of the GALL Report (NUREG-1801, April 2001) did not identify cracking as an aging effect/mechanism for copper alloy material. A search of EPRI TR-114882, Non-Class 1 Implementation Guideline and Mechanical Tools, showed that aluminum was not susceptible to SCC/IGA cracking but could be susceptible to cracking due to vibration. None of the aluminum components in Plant X are located in high vibration areas. Therefore, no site specific operating experience indicates these components are susceptible to cracking.*

2. Table 3.4.1 of the LRA indicates that the general corrosion of the external surfaces program is proposed for managing the aging effects associated with loss of material, cracking, and loss of preload in bolting. This program consists of a visual examination to detect external corrosion and fluid leakage.

A) Identify the ASME Class for the bolting in the SPCS within the scope of license renewal.

B) Identify the ASME Code inservice inspection requirements for the bolting in the SPCS within the scope of license renewal. Identify the inservice inspection program (i.e. extent, frequency and acceptance criteria) to detect cracking for non-ASME Code bolting within the scope of the program.

C) Identify the lubricants and sealants used for installing the bolting. Explain why these lubricants and sealant will not cause cracking in bolting.

D) Provide the basis that the general corrosion of the external surfaces program will adequately manage the aging effects of cracking and loss of preload for bolting.

Response: *The application will be revised to include a Bolting Integrity Program consistent with the GALL Report for managing the aging effects associated with loss of material, cracking, and loss of preload in bolting.*

3. Table 3.4.1 of the LRA indicates that the general corrosion of the external surfaces program is proposed for managing loss of material from atmospheric corrosion. This program consists of a visual examination to detect external corrosion and fluid leakage. Explain why the external surface of carbon steel components is not susceptible to boric acid corrosion. If the external surface of the carbon steel components is susceptible to boric acid corrosion, explain how the general corrosion of the external surfaces program is equivalent to the guidelines in Generic Letter 88-05 for detection of boric acid corrosion.

Response: *The application will be revised to be consistent with the GALL Report, to include the Boric Acid Corrosion Program as an aging management program for corrosion of external surfaces due to leaks from adjacent components containing borated water.*

4. Tables 3.4-1 and 3.4-2 of the LRA indicate that there are carbon steel, stainless steel and copper alloys components in a water environment. Are these components connected within a water containing system that could result in loss of material from galvanic corrosion? If these components are susceptible to loss of material due to galvanic corrosion, identify the program that will manage the loss of material from galvanic corrosion.

Response: *In the case of carbon and stainless steel, galvanic corrosion applies where carbon steel is attached to stainless steel, e.g., at SS instrument line connections. The rate of galvanic corrosion is governed by the relative size of the anode to cathode. If the anode is appreciably larger than the cathode, then the galvanic corrosion rate is slow. In this case, the anode (CS piping system) is much larger than the cathode (SS instrument lines), so galvanic corrosion will not be significant and no program is needed to manage the loss of material from galvanic corrosion.*
Copper alloys are in the middle of the galvanic series with steel and alloy steel being more anodic (or active) and the stainless steels being more cathodic (or passive). When coupled with the more anodic materials such as carbon steel, the copper alloys exhibit reduced corrosion effects, whereas the carbon steel will be corroded. As discussed in the previous paragraph the anode (CS piping system) is much larger than the cathode (copper tubing in the oil cooler), so galvanic corrosion will not be significant and no program is needed to manage the loss of material from galvanic corrosion.
When copper alloys are galvanically coupled to the more cathodic materials such as stainless steel, the copper alloys may demonstrate an increased susceptibility to corrosion. In this case the steam driven auxiliary feedwater pump oil cooler and the other brass components in the system (a couple of valves) are not in direct contact with the SS tubing in the system. The other factor that has to be considered in galvanic corrosion is the resistance in the circuit, i.e. the water. Because the AFW water is pure and a poor conductor, and the galvanic potential of the SS and Brass series is low (approximately .15 volts vs. SS and CS series which has .4 volt) the rate of corrosion will not be significant and no program is needed to manage the loss of material from galvanic corrosion.

5. The FSAR supplement for the flow accelerated corrosion (FAC) program indicates that the program relies primarily on monitoring and inspection of piping/components to preclude failure of high and low energy carbon steel piping. However, the FSAR supplement does not reference the basis for the program, which is EPRI guidelines in NSAC-202L-R2. Therefore, the FSAR supplement for the FAC Program should reference EPRI guidelines of NSAC-202L-R2.

Response: *The FSAR supplement will be revised to include the reference to NASC-202L-R2.*

6. Provide clarification for the statement in section 3.4 of the LRA that states, "Searches were conducted of industry experience. These reviews revealed no evidence of additional aging effects requiring management." However, the applicant had not identified aging effects requirement management (AERMs) before this statement. Please state/clarify as applicable, that the applicant for Plant X has reviewed plant-specific and industry wide operating experience and concluded that operating experience is bounded by the GALL report and that no additional operating experience has been identified. Provide information on any additional aging effects identified and how they would be managed for license renewal.

Response: *The wording in the LRA will be revised similar to the following: "(The Applicant) has reviewed plant-specific and industry-wide operating experience to identify aging effects requiring management, and has concluded that operating experience is bounded by the GALL Report. A further review of the recent operating experience, issued after April 2001, identified no aging effects requiring management beyond those identified in the GALL Report."*
If aging effects requiring management are identified that are not included in the GALL Report, then an applicable statement similar to the following would be provided: "(The Applicant) has reviewed plant-specific and industry wide operating experience to identify aging effects requiring management and has identified the following aging effects requiring management beyond those identified in the GALL Report." OR "A further review of the recent operating experience, issued after March 2001, identified the following aging effects requiring management beyond those identified in the GALL report."

7. The FAC program as defined in Appendix B of the LRA applies only to the main steam, feedwater, and steam generator blowdown systems. However, page 3.4-2 of the application indicates that the scope of steam and power conversion (SPCS) system consists of main steam, extraction steam, main and auxiliary feedwater, condensate, and steam generator blowdown systems. The FAC program in Appendix B does not cover extraction steam, auxiliary feedwater and condensate system. Similarly, Table 3.4.1 infers that the main steam, extraction steam, and main and auxiliary feedwater systems, condensate system, steam generator blowdown and associated components are managed by the AMP, "General Corrosion of External Surfaces for License Renewal;" however, the AMP, "General Corrosion of External Surfaces for License Renewal," described in Appendix B of the LRA does not include all the systems cited in Table 3.4.1. Clarify systems addressed by the AMP, "General Corrosion of External Surfaces for License Renewal."

Response: *The demo LRA was developed using the results of a partially completed Integrated Plant Assessment (IPA). As a result, the descriptive text on Page 3.4-2 indicates that the scope of SPCS consists of main steam, extraction steam, main and auxiliary feedwater, condensate, and steam generator blowdown systems. Further work on the Plant X IPA determined that extraction steam and condensate are not in the scope of the SPCS portion of the IPA and that only the containment penetration portion of steam generator blowdown was within scope of the SPCS. Page 3.4-2 of the application will be revised to properly reflect these changes in the IPA. The descriptive text of the Plant X LRA will be revised to only include those systems and components determined to require an Aging Management Review.*
As addressed in Section VIII.G of the GALL Report, FAC is only identified in as Aging Effect Requiring Management for an environment of treated water with a temperature greater than 90EC. The environment for the auxiliary feedwater system in Plant X is treated water with a temperature less than 90EC.

8. Are the carbon steel SPCS components (including stagnant lines, main actuation/isolation valves, etc.) exposed to a raw water environment due to standby conditions, actuation of the back-up systems, or testing? If so, provide operating experience and the AMP for the SPCS carbon steel components relating to the aging effects of loss of material due to microbiologically influenced, general, and pitting corrosion, and biofouling.

Response: *The carbon steel SPCS components at Plant X do not interface with the any systems containing raw water.*

9. Since the preparation of the referenced GALL report (August 2000), the staff issued Information Notice (IN) 2001-09 on the FAC of the main feedwater system inside the containment. For components identified in the IN, has an inspection been performed for Plant X? If not, what inputs are used in CHECKWORKS for the subject components?

Response: *In the LRA, the applicant may describe how operating experience is incorporated into the aging management programs. At Plant X, operating experience is processed using the corrective action system. Operating experience is identified and assigned to a program owner for resolution. In this case the subject Information Notice was assigned to the FAC program owner for resolution. For the subject components, inspections have been performed for Plant X and were found to be acceptable in accordance with the acceptance criteria of the FAC program.*

10. Are the blowdown heat exchangers, oil coolers, and condenser in the condensate system exposed to open cycle cooling water system? If so, explain why the heat exchangers, coolers, and condensers exposed to the open cycle cooling water system are not susceptible to buildup of deposit due to biofouling.

Response: *The demo LRA was developed using the results of a partially completed Integrated Plant Assessment (IPA). As a result the descriptive text on Page 3.4-2 indicates that the scope of SPCS consists of main steam, extraction steam, main and auxiliary feedwater, condensate, and steam generator blowdown systems. Further work on the Plant X IPA determined that condensate is not in the scope of the SPCS portion of the IPA and that only the containment penetration portion of steam generator blowdown was within scope of the SPCS. Page 3.4-2 of the application will be revised to properly reflect these changes in the IPA. The AFW oil coolers are cooled using treated water and are not susceptible to buildup of deposit due to biofouling.*

RAIs FOR PLANT X
SECTION 3.5: CONTAINMENT, STRUCTURES, AND COMPONENT SUPPORTS

1. Section 3.5.1.1 of the LRA addresses two (2) areas where the GALL report recommends further evaluation. LRA subparagraph 3.5.1.1.1 addresses further evaluation for detection of cracking due to cyclic loading and crack initiation and growth from SCC in containment penetration sleeves, bellows and dissimilar metal welds. The LRA states that Plant X utilizes carbon steel bellows and therefore there are no dissimilar metal welds. In the LRA it is not clear if any stainless steel penetration sleeves exist in Plant X. Does Plant X contain any stainless steel elements in this component group? Also describe the methodology for detection of cracking due to cyclic loading.

   Response: *There are no stainless steel bellows utilized at Plant X. Cracking due to cyclic loading of carbon steel bellows is detected using the ISI and leak rate test programs.*

2. Section 3.5.1.2.1 of the LRA states that the concrete at Plant X is not exposed to aggressive river water or ground water. Provide the most recent testing results supporting the above statement and discuss pertinent technical basis supporting the assertion that the prevailing non-aggressive characteristics of Plant X river/ground water will remain essentially unchanged for the period of extended operation. The response should also include a discussion of the groundwater/river water chemistry monitoring program, including frequency and consideration of seasonal variations.

   Response: *The applicant completed tests of ground water in 2000 demonstrating that the below-grade environment is not aggressive (pH >5.5, chlorides <500 ppm, or sulfates <1500 ppm). These test results were compared to the results from the testing performed during plant construction. This comparison indicates no change in groundwater aggressiveness in approximately 30 years. No further programmatic monitoring of groundwater is required (i.e., no aging management program is required if there are no aging effects requiring management).*
   The issue of the GALL Report recommending a program be implemented to assure an aging management program is not required when no aging effect/mechanism is identified in an LRA should be discussed at the July 25, 2001 meeting.

3. Section 3.5.1.1.2 of the LRA indicates that visual inspection of the seal between the containment floor and the containment steel liner can be used to effectively address aging in this area resulting from corrosion. If the seal is intact, no action would be required. If this seal were determined to be damaged, then appropriate portion of the liner would be accessed and inspected. What is the technical basis for concluding that if damage or degradation of this seal is not visible, then degradation of the containment liner has not occurred. In addition, cracks in concrete floor above the embedded steel liner are other potential paths for degradation of the containment liner. Describe the approach to managing this aging effect if cracks develop in the concrete floor.

Response: *If no degradation to the seal occurs then the liner can be treated as embedded steel in a concrete structure. Per the NRC GALL Report, corrosion of embedded steel is not significant for concrete structures above grade, below grade, or protected from the weather (i.e., in plant indoor air) that are exposed to a non-aggressive environment. A non-aggressive environment, as defined by the NRC GALL Report, is one with a pH greater than 11.5 or chlorides less than 500 ppm. The NRC GALL Report also concludes that corrosion of embedded steel is not significant for concrete structures exposed to an aggressive environment but have a low water-to-cement ratio, adequate air entrainment, and designed in accordance with ACI 318-63 or ACI 349-85. A low water-to-cement ratio is defined as 0.35 to 0.45 and adequate air entrainment is defined as 3 to 6 percent. The concrete at Plant X is not exposed to aggressive river water or groundwater. There is no heavy industry in the area whose emissions would cause degradation to concrete. There is no environment in plant indoor air which would be considered aggressive. In addition, per ACI 201.2R, concrete has a pH greater than or equal to 12.5. The conditions specified in the NRC GALL Report have been satisfied; therefore, aging management is not required. The applicant has determined there are no aging effects requiring management, including cracking, for the Class 1 concrete structures at Plant X and therefore no aging management program is required.*

4. Clarify what is intended to be covered in the demonstration project with respect to Section 3.5.1 of the LRA. This subsection is silent in the following four areas, when compared to SRP Table 3.5-1: (1) no reference to protective coatings, to mitigate loss of material due to corrosion of containment elements; (2) no reference to aging management of inaccessible areas of Class 1 structures; (3) no reference to aging management of masonry walls in Class 1 structures; and (4) no reference to aging management of high-strength low-alloy bolting for component supports. Provide an explanation why these are not applicable to Plant X or, if they are applicable, provide an aging management review (AMR) including a description of the credited aging management programs (AMPs).

   Response:

   (1) The Protective Coatings Program is not an aging management program used at Plant X.

   (2) The applicant has determined there are no aging effects requiring management for the Class 1 concrete structures at Plant X and therefore, no reference is made to inaccessible areas for aging management of concrete. The applicant has determined Class 1 steel components and structures are accessible and a program for inaccessible areas is not required.

   (3) As discussed in previous responses, the Plant X demonstration LRA was developed using the results of a partially completed Integrated Plant Assessment (IPA); the IPA portion for masonry walls was not complete. The Plant X LRA will be revised to include masonry walls and a Masonry Wall program consistent with the GALL Report.

   (4) The application will be updated to include a Bolting Integrity Program consistent with the GALL Report for aging management of high-strength low-alloy bolting for component supports.

5. In paragraph 3.5.1.2.2 of the LRA, the applicant states that "The structures at Plant X are supported on end-bearing steel piles driven to bedrock. Settlement and erosion of porous concrete subfoundation are not plausible aging mechanisms; therefore, aging management is not required." Provide the following information for Plant X:

A) Does Plant X have a de-watering system?
B) Does Plant X have a porous concrete subfoundation?
C) Was Plant X required to monitor settlement of structure during the initial years of operation? If so, was relief to terminate settlement monitoring granted by the staff?
D) If there is an active settlement monitoring program at Plant X, describe the plant-specific foundation features that necessitate the continuation of this program.

Response:

a) No, Plant X does not have a dewatering system.
b) No, Plant X does not have a porous concrete subfoundation.
c) No, Plant X was not required to monitor settlement of structure during the initial years of operation.
d) There is no active settlement monitoring program at Plant X.

6. Table 3.5.1 of the LRA for the turbine and auxiliary buildings does not address aging of inaccessible concrete components. Since the foundation for the auxiliary building is common to that of the containment, are inaccessible areas of the auxiliary building such as walls below grade and foundation addressed along with those of the containment? How will aging of inaccessible concrete and steel components for the turbine building (Class 1 structure) such as exterior walls below grade and the foundation be addressed?

   Response: *The applicant has determined there are no aging effects requiring management for the Class 1 concrete structures at Plant X and therefore, no reference is made to inaccessible areas for aging management of concrete. . The applicant has determined that Class 1 steel components and structures are accessible; therefore, a program for inaccessible areas is not required.*

7. Table 3.5.1 of the LRA states that "The information in the GALL report bounds Plant X for steel components." Does it also bound concrete components? If not, explain the basis. Also in the structure monitoring program (SMP) provided in Appendix B states that: "with identified enhancements, the SMP is consistent with the ten attributes identified in GALL report (August 2000 Draft) for SMP XI.S6." Explain what the "identified enhancements" are?

   Response: *Table 3.5.1 will be revised to differentiate concrete and steel components. The Discussion column will be revised to state "Aging evaluation for concrete components is different from that described in GALL – see Sections 3.5.1.2.1 through 3.5.1.2.4. The information in the GALL Report bounds Plant X for steel components." The "identified enhancements" are the revisions to the SMP to make it consistent with the ten attributes of the GALL Report. These revisions will be completed prior to implementation of the SMP during the renewal period.*

   The issue of how an applicant should state that a program will be revised to be consistent with GALL prior to implementation of the aging management program should be discussed at the July 25, 2001 meeting.

8. In Section 3.5.1.2.3 of the LRA related to "Elevated Temperatures", local temperature effects on concrete other than penetrations (i.e., steam pipe tunnel, shear/biological shield wall near reactors) were not discussed. Provide information to evaluate the applicability of temperature effects on the steam pipe tunnel and shear/biological shield wall near reactors.

   Response: *The reactor vessel annulus outlet temperature does not exceed a temperature found to correlate to 150 degrees F concrete temperature based on the nuclear detector cooling system temperature limit in the Technical Specifications for Plant X.*

9. The primary chemistry monitoring program description in the LRA indicates the exception that a one-time inspection requirement is not warranted. Discuss actual chemistry related degradation for primary components/item groupings that has been experienced at Plant X to support this basis for the exception.

   Response: *Within the Containment, Structures and Component Supports sections of the GALL the primary water chemistry program is identified as an Aging Management Program for stainless steel liners exposed to water (III.A.5.2-b). The revised Plant X LRA Table 3.5.2 (attached) also identifies the primary water chemistry program as an Aging Management Program for the fuel transfer tube. In both cases monitoring the pool water level and/or pool leakage are used to verify the effectiveness of the primary water chemistry program. Therefore, a one-time inspection is not warranted.*

10. Page 3.5.2 of the LRA states, based on review of site and industry operating experience, "These reviews revealed no evidence of additional aging effects requiring management." However, the applicant had not identified AERMs before this statement. Clarify the purpose of this statement (a similar RAI appears in section 3.4, item #6 of this enclosure).

    Response: *See the response to Item 6 for Section 3.4, Steam and Power Conversion System, of the LRA demo.*

11. Section 3.5 of the LRA begins with a brief description of the Plant X containment structure, containment internal structures, turbine building, and intake structure. However, no description of the auxiliary building/control room or of the component supports is provided. Provide a description of the auxiliary building/control room. Also, describe the supports included in this group along with a description of their features or environments.

    Response: *As discussed in other responses, the Plant X demonstration LRA was developed using the results of partially completed Integrated Plant Assessment (IPA). The Plant X LRA will be revised to include a description of the auxiliary building, control room and component supports.*

12. Section 3.5.2 of the LRA describes "Components or Aging Effects that Are Not Addressed in the GALL Report" in general terms and does not include a discussion of AMPs. Table 3.5.2 identifies the specific components, material, environment, AERMs, and program/activity. The information provided is not sufficient for the staff to tie subsection

3.5.2 and Table 3.5.2 together and to evaluate the AMR for the identified components/aging effects. Provide a description of the components in the Table 3.5.2 and explain how they are related to the text.

Response: *Subsection 3.5.2 has been rewritten and is attached. Note that the text portion does not include a discussion of the aging management programs. Table 3.5.2 is used to tie a component, material and aging effect requiring management to an aging management program.*

13. Section 3.5.3 of the LRA is titled "Conclusion" and it lists five AMPs that are credited for managing aging. The conclusion does not address additional AMPs listed in LRA Table 3.5.1 to manage aging. Specifically, the inspection of water control structures, boric acid corrosion, and inservice inspection AMPs are credited in LRA Table 3.5.1, but are not listed in LRA subsection 3.5.3. Clarify which AMPs evaluated in the GALL report are being relied on for license renewal for Plant X and provide corrections to LRA subsection 3.5.3 and LRA Table 3.5.1, as appropriate.

    Response: *The demo LRA was developed using the results of a partially completed Integrated Plant Assessment (IPA), and therefore internal consistency within Section 3.5 was not attained. The Plant X LRA will be revised to ensure this consistency.*

14. Clarify the intended coverage of "Components Group" in Table 3.5.1 of the LRA in the demonstration project. For example, it indicates for "Equipment hatch gasket," the information in the GALL report bounds Plant X. However, SRP Table 3.5-1 includes "Gaskets, seals, and moisture barriers." Are the other gaskets, seals, and moisture barriers outside of the demonstration project?

    Response: *The demo LRA was developed using the results of a partially completed Integrated Plant Assessment (IPA) and work had not been completed on the Components Group. The Plant X LRA Table 3.5.1 will be revised to be consistent with SRP Table 3.5-1 and any differences between the SRP "Structures and/or Components" will be discussed in the "Discussion" column of the LRA table.*
    The issue of how the LRA should be worded when all the components in a GALL Report line item are not applicable to the LRA for a specific plant.

15. Paragraph 3.5.1.2.4 of the LRA does not contain a discussion on "reaction with aggregates" even though it is part of the subsection title. Provide the apparent missing information related to reaction with aggregates.

    Response: *As described in NUREG-1557, investigations, tests, and petrographic examinations of aggregates performed in accordance with ASTM C295 or ASTM C227 can demonstrate that those aggregates do not react within reinforced concrete. The mix design for concrete utilized at Plant X was tested in accordance with ASTM C295 and C227 and shown to be non-reactive; therefore, reaction with aggregates is not an applicable aging mechanism for concrete at Plant X. Aging management is not required.*

16. The FSAR revision provided in Appendix B of the LRA for the structures monitoring program is not sufficient because it only credits this program for managing the aging effects of loss of material and not other applicable aging effects. In addition, no FSAR revision was provided for the containment inservice inspection program. Submit an appropriate FSAR description for the structures monitoring program and the containment inservice inspection program.

Response: *The FSAR revision will be changed to reference the Structures Monitoring Program consistent with the scope statement from Appendix B of the submittal. The FSAR revision will include the Containment Inservice Inspection Program.*

RAIs FOR PLANT X
SECTION 3.6: ELECTRICAL AND INSTRUMENTATION AND CONTROLS

1. Section 3.6.2.1 of the LRA states that a one-time inspection will be performed prior to the end of the current license period to ensure that the duct banks in which non-EQ inaccessible medium-voltage cables are enclosed at Plant X remain effectively sealed. However, the electrical component inspection program described in Appendix B does not discuss this inspection of the duct banks, and does not appear to be consistent with section 3.6.2.1 of the LRA. Instead, the program described in Appendix B states that visual inspection of selected samples of the accessible portion of medium-voltage cables will be used to detect aging effects for non-EQ inaccessible medium voltage cables. Please provide clarification as to what the intended AMP for inaccessible medium-voltage cables will include.

Response: *In preparing the Plant X demo LRA Section 3.6.2.1 (inspection program) was written independent and separate from the electrical component inspection program section described in Appendix B. The Plant X LRA sections will be revised to be consistent with the terminology and descriptions provided in Appendix B of the LRA.*

Plant X LRA
Revised Section 3.5.2

3.5.2 Components or Aging Effects that Are Not Addressed in the GALL Report

Table 3.5.2 contains the Structures and Component Supports aging management review results for internal and external environments that are not included in the GALL Report. These tables include the component types, materials, environments, aging effects requiring management, and the programs and activities for managing aging.

The following combinations of materials and environments exist for the components subject to aging management in the Structures and Component Supports. Each of these combinations represents an aging management review group (AMR group):

- Structural Stainless Steel in Plant Indoor Air/Borated Water
- Structural Stainless Steel in Plant Indoor Air
- Neoprene in Plant Indoor Air

3.5.2.1 Structural Stainless Steel In Plant Indoor Air/Borated Water

Stainless steel inside buildings is protected from the atmosphere/weather. It may be exposed to temperatures up to 120 deg F and 100% humidity. The stainless steel is exposed to 140 deg F borated water during refueling.

Aging Effects Requiring Management, and Mechanisms:

Cracking

Due to stress corrosion cracking (SCC): SCC is an aging effect requiring management due to the exposure of stainless steel to halogens, sulfates, and stress.

Due to fatigue/cyclic loading: Cracking due to fatigue is an aging effect requiring management due to the progressive, localized structural change in materials subjected to fluctuating stresses and strains.

Loss of Material

Due to crevice corrosion: Loss of material due to crevice corrosion is an aging effect requiring management due to the exposure of stainless steel to dissolved oxygen.

Due to Pitting Corrosion: Loss of material due to pitting corrosion is an aging effect requiring management due to the exposure of stainless steel to halogens and sulfates.

3.5.2.2 Structural Stainless Steel In Plant Indoor Air

Stainless steel inside buildings is protected from the atmosphere/weather. It may be exposed to temperatures up to 120 deg F and 100% humidity.

Aging Effects Requiring Management, and Mechanisms:

No Aging Effects Requiring Management were identified for stainless steel in ambient air.

3.5.2.3 Neoprene in Plant Indoor Air

Neoprene inside buildings is protected from the atmosphere/weather. It may be exposed to temperatures up to 120 deg F and 100% humidity.

Plant X LRA
Revised Section 3.5.2

Aging Effects Requiring Management, and Mechanisms:

Cracking

Due to thermal exposure: Cracking due to thermal exposure is an aging effect requiring management due to the prolonged exposure of neoprene to temperatures above 95 deg F.

Change in Material Properties

Due to thermal exposure: A change in material properties due to thermal exposure is an aging effect requiring management due to the prolonged exposure of neoprene to temperatures above 95 deg F.

Plant X LRA
Revised Section 3.5.2

Table 3.5.2 Structures and Component Supports or Aging Effects that Are Not Addressed in the GALL Report				
Structure and/or Component	**Material**	**Environment**	**AERMs**	**Program/Activity**
Fuel Transfer Tube connecting Containment and the Auxiliary Building	Stainless Steel	Plant Indoor Air/Borated Water	Loss of Material Cracking	Containment Leak Rate Program Monitoring of pool level and leakage Chemistry Program
Trisodium Phosphate Baskets in Containment	Stainless Steel	Plant Indoor Air	None	Not Applicable
Flood Panel Seals in the Intake Structure and Auxiliary Building	Neoprene	Plant Indoor Air	Cracking Change in Material Properties	Periodic Surveillance and Preventive Maintenance

Response to Request for Additional Information For the Review of the Nuclear Energy Institute Demonstration Project

Plant Y Demonstrates the Use of GALL in an Application that Follows the Six-column Format

July 11, 2001

RAIs FOR PLANT Y
SECTION 3.4: STEAM AND POWER CONVERSION SYSTEMS

1. Tables 3.4-1 and 3.4-2 of the LRA indicate an inconsistency in that cracking is identified as an aging effect for stainless steel components in treated water-secondary environment; but is not an aging effect for stainless steel components in treated water. Furthermore, Table 3.4-2 indicates that stainless steel components (standby steam generator feedwater pump suction) are located in an outdoor environment and are susceptible to cracking; but cracking is not an aging effect for buried piping. The table footnote indicates that plant experience has identified the potential for cracking in non-stress relieved heat affected zones of weld joints for the piping in an outdoor environment. Identify the plant-specific and industry experience, including maintenance and inspection, that supports the conclusion that cracking is not an aging effect in treated water and buried environments. The response should specifically discuss why cracking is not applicable to stainless steel in treated water and buried environments.

   Response: *As described in Appendix C of the license renewal application (LRA), stainless steel is considered susceptible to stress corrosion cracking at temperatures >140 °F in a treated water environment. The standby feedwater components are normally at ambient conditions and do not exceed this temperature threshold. Plant specific experience has identified stress corrosion cracking of stainless steel in an outdoor environment that involves occasional wetting due to rain. The buried piping is located under roadways and concrete slabs and therefore is not exposed to the wetted environment required for stress corrosion cracking. As such, cracking is not an applicable aging effect requiring management.*

   Comment: The Plant Y LRA demonstration did not include an Appendix C description of the process for identifying aging effects requiring management for non-class 1 components.

2. Tables 3.4-1 and 3.4-2 of the LRA indicate that cracking of stainless steel components will be managed by the secondary chemistry monitoring program alone. This program monitors water chemistry but does not identify cracking or monitor crack growth. Explain why inspections for cracking and monitoring of crack growth are not necessary.

   Response: *As described in Appendix C of the LRA, limiting the halogen content to <150 ppb and the sulfate content to <100 ppb is an effective means of precluding stress corrosion cracking in stainless steel. This is consistent with the approach for primary systems as described in NUREG-1801. As such, inspections for cracking and monitoring of crack growth are not necessary.*

   Comment: The Plant Y LRA demonstration did not include an Appendix C description of the process for identifying aging effects requiring management for non-class 1 components.

3. The staff believes that verification of the effectiveness of the chemistry control program is necessary for loss of material due to general, crevice, and pitting corrosion for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, and tanks in treated water. A one-time inspection is an acceptable method of verifying the effectiveness of chemistry monitoring programs for preventing the loss of material due to general, crevice, and pitting corrosion for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines in treated water. Identify the

most susceptible locations within these components to general, crevice, and pitting corrosion. Also, identify how these components were determined to be not susceptible to loss of material.

Response: *During routine and corrective maintenance requiring equipment disassembly, internal surfaces of components are visually inspected for loss of material and other aging effects. If the results of the inspections indicate loss of material (other than light surface corrosion), cracking, or fouling, the condition is evaluated pursuant to the Plant Y corrective action program. The corrective action process includes cause determination and if the aging mechanism is not readily apparent, metallurgical analysis may be performed. The metallurgical analyses include the use of standard metallurgical laboratory techniques for the identification of aging mechanisms such as crevice and pitting corrosion. A review of approximately 100 metallurgical laboratory reports associated with license renewal passive components, was performed to identify any material failures attributed to corrosion. This review concluded that there have been no occurrences of general, pitting or crevice corrosion in treated water systems. Therefore, the effectiveness of the Chemistry Control Program has been verified. Note that this information is included in Appendix C of the LRA.*

Comment: The Plant Y LRA demonstration did not include an Appendix C description of the process for identifying aging effects requiring management for non-class 1 components.

4. Loss of material due to general corrosion and microbiologically-influenced corrosion (MIC) could occur in stainless steel and carbon steel shells, tubes, and tubesheets within the bearing oil coolers. Corrosion is an aging effect for components within the bearing oil coolers, if water is present. The LRA indicates that carbon steel components within the auxiliary feedwater pump containing lube oil are not subject to an aging effect requiring management. Since the bearing oil coolers and the auxiliary feedwater pumps lube oil components appear to have a similar environment, explain the basis for determining that auxiliary feedwater pumps lube oil components are not subject to loss of material due to corrosion resulting from water contamination of the auxiliary feedwater lube oil.

   Response: *Plant history has not identified any cases of water contamination of the auxiliary feedwater lube oil. Therefore, water contamination was not considered to be applicable to this system.*

5. Industry operating experience indicates that bolting experiences cracking and loss of preload as aging effects. Provide the basis for the conclusion that the AMP for bolting at Plant Y need not manage the aging effects associated with cracking and loss of preload.

   Response: *Loss of pre-load of mechanical closures can occur due to settling of mating surfaces, relaxation after cyclic loading, gasket creep, and loss of gasket compression due to differential thermal expansion. The loss of pre-load due to these mechanisms can result in leakage at the joint, e.g. gasket or seal leakage, not failure of the mechanical joint. The ASME Code does not consider gaskets, seals, and O-rings to perform a pressure retaining function. It follows that the loss of pre-load from the above mechanisms does not result in loss of mechanical closure or loss of pressure boundary integrity. It is noted that Plant Y utilizes proper bolt torquing procedures to prevent loss of pre-load, and leakage of mechanical joints due to loss of pre-load has not been a significant issue at Plant Y. Therefore, no aging effects associated with loss of pre-load resulting from settling, relaxation*

after cyclic loading, gasket creep, and temperature effects are considered to require management during the period of extended operation.

At Plant Y, the potential for SCC of fasteners is minimized by utilizing ASTM A193, Gr. B7 bolting material and limiting contaminants such as chlorides and sulfur in lubricants and sealant compounds. Additionally, sound maintenance bolt torquing practices are used to control bolting material stresses. These actions have been effective in eliminating the potential for SCC of bolting materials. The results of a review of Plant Y operating experience supports this conclusion in that no instances of bolting degradation due to SCC were identified. Therefore, cracking of bolting material due to SCC is not considered an aging effect requiring management at Plant Y.

The above information is included in Appendix C of the LRA for Plant Y.

Comment: The Plant Y LRA demonstration did not include an Appendix C description of the process for identifying aging effects requiring management for non-class 1 components.

6. Tables 3.4-1 through 3.4-3 of the LRA indicate that the structure monitoring program is used to monitor the loss of material on the external surface of carbon steel and stainless steel components in an outdoor environment. The application indicates that the structures monitoring program is consistent with the ten attributes of the aging management program XI.S6, specified in GALL (August 2000-Draft) Chapter XI. However, program XI.S6 in GALL is written for monitoring structures or structural components. The components identified in Tables 3.4-1 through 3.4-3 that identify the Structure Monitoring Program to manage aging effects are not structures. The components identified are tanks, pumps, valves, pipes, fittings, tubing, strainers (standby steam generator feedwater pump suction), orifices, steam traps, auxiliary feedwater pump lube oil cooler and cooler shells and channels. Provide the basis for the determination that the proposed program is consistent with the evaluation in the GALL as claimed.

   Response: *With respect to structures/structural components, the "Structures Monitoring Program" is consistent with GALL program XI.S6. With respect to non-structural components, the plant-specific "Systems Monitoring Program" should have been referenced and included in LRA Appendix B.*

7. Are the carbon steel SPCS components (including stagnant lines, main actuation/isolation valves, etc.) exposed to a raw water environment due to standby conditions, actuation of the back-up systems, or testing? If so, provide operating experience and the AMP for the SPCS carbon steel components relating to the aging effects of loss of material due to microbiologically influenced, general, and pitting corrosion, and biofouling.

   Response: *The internal environment for the SPCS components is treated water, whether the components are in service, being tested or in standby.*

8. Since the preparation of the referenced GALL report (August 2000), the staff issued Information Notice (IN) 2001-09 on the flow accelerated corrosion of the main feedwater system inside the containment. For the subject components, has an inspection been

performed for Plant Y? If not, what inputs are used in CHECKWORKS for the subject components?

Response: *FAC inspections have been performed on the subject main feedwater system components inside containment. These components were found to be acceptable in accordance with the acceptance criteria of the FAC Program.*

9. Table 3.4.2 of the LRA lists buried piping as a component subject to aging management for the standby steam generator feedwater pump suction and states there are no applicable aging effects and no AMP is required. Operating experience indicates that buried stainless steel and carbon steel components may degrade. Provide the basis for why there are no aging effects for buried stainless steel components. In addition, are there any buried carbon steel components within the scope of license renewal? If so, describe the applicable aging effects and provide an AMP for the buried carbon steel components. The field erected tanks internal inspection program description states that the presence of corrosion that could lead to loss of material will be determined by visual inspection of the accessible areas of the field erected tanks. The LRA further states that internal surfaces will be examined for evidence of flaking, blistering, peeling, discoloration, pitting, or excessive corrosion. Are there inaccessible areas in these tanks? If so, how would the inaccessible areas be inspected?

   Response: *The buried piping is located under roadways and concrete slabs and therefore is not exposed to the wetted environment required to support aging of stainless steel. There are no buried carbon steel components in the SPCS systems. There are no inaccessible areas in the field erected tanks.*

10. Industry operating experience demonstrates that the potential aging effects of loss of material, loss of preload, crack initiation and growth are applicable for bolting components in an atmospheric environment. It is unclear if the LRA adequately addresses the pertinent aging effects associated with bolting integrity for the SPCS. Does the aging effect, "loss of mechanical closure integrity," include the potential aging effects of loss of material, loss of preload, crack initiation and growth? Tables 3.4-1 and 3.4-2 of the LRA list "Boric Acid Wastage Surveillance Program" (not available for staff review) as the AMP for managing these aging effects for the main steam and turbine generator, feedwater, blowdown, and chemical addition systems. Also, the LRA listed no AMP program as being required for AFW bolting in Table 3.4-3.

    A) Identify the ASME Class for the bolting in the SPCS within the scope of license renewal.
    B) Identify the ASME Code inservice inspection requirements for the bolting in the SPCS within the scope of license renewal. Identify the inservice inspection program (i.e. extent, frequency and acceptance criteria) to detect cracking for non-ASME Code bolting within the scope of license renewal.
    C) Identify the lubricants and sealants used for installing the bolting. Explain why these lubricants and sealants will not cause cracking in bolting.
    D) Describe the AMP that will manage the aging effects of cracking and loss of preload within the scope of license renewal.

Response: *Aging effects associated with bolting are described in Appendix C of the LRA. The only aging effect determined to require management associated with bolting is loss of mechanical closure integrity due to boric acid corrosion for components in proximity to borated water systems. All carbon steel bolting associated with the Steam and Power Conversion Systems is coated with a lubricant and loss of material due to general corrosion is not expected. A review of Plant Y operating experience, which was performed as part of the AMR process, confirmed that no loss of mechanical closure integrity has occurred resulting from loss of material due to general corrosion of bolting. Review of industry experience also confirms that general corrosion of bolting has not been a major concern and therefore is not an aging effect requiring management. Loss of mechanical closure integrity due to loss of preload and cracking is addressed in the response to Question 5 above.*

Bolting (mechanical closures) is listed Table 3.4.3 for the Auxiliary Feedwater (AFW) System. However, since the AFW System is not in the proximity to any borated water systems, loss of mechanical closure integrity due to boric acid corrosion is not an aging effect requiring management.

A) Bolting for the SPCS within the scope of license renewal is designed to ASME Section III Class 3 or ANSI B31.1.
B) As discussed above, the ASME Code inservice inspection requirements are not
C) At Plant Y, the potential for SCC of fasteners is minimized by utilizing ASTM A193, Gr. B7 bolting material and limiting contaminants such as chlorides and sulfur in lubricants and sealant compounds.
D) As discussed in the response to Question 5 above, cracking and loss of preload do not require aging management.

11. Appendix B of the LRA, "Programs Descriptions and FSAR Sections Consistent with the GALL report," states that the flow accelerated corrosion program is applicable to the main steam, feedwater, and blowdown systems. Industry experience as noted in NRC GL 89-08, IN 81-28, IN 89-53, IN 91-18 indicates that FAC is also applicable to the auxiliary feedwater, condensate storage, and chemical addition systems. Explain why the LRA does not address the program as applicable to these systems and their associated carbon steel components (i.e. piping, pump casing, etc.). Similarly, the turbine generator system was described as part of the scope of section 3.4 of the LRA (page 5) but was not apparent in the text or tables of this section. Please provide the apparent missing information for the turbine generator system or explain the discrepancy.

Response: *The scope of the Plant Y FAC program excludes standby systems that are operated less than 2% of the normal plant operating time. Therefore, the auxiliary feedwater, condensate storage and chemical addition systems are not included in the program. As indicated on the P&IDs submitted in support of the LRA, the only components included for the turbine generator system is tubing for instrumentation required to support ATWS. This tubing is included in Table 3.4-1.*

Comment: P&IDs were not included with the Plant Y LRA demonstration.

12. Table 3.4-1 of the LRA does not include steam as a potential environment for the main steam and turbine generator systems. The staff would expect the main steam and turbine generator systems to be subject to a steam environment. Explain why steam is not the environment for these systems.

    Response: *As described in Table 3.0-1, steam is considered to be a "Treated water – secondary" environment. "Treated water – secondary" is listed as one of the applicable environments in Table 3.4-1.*

13. Table 3.4-2 of the LRA lists primary water chemistry as the AMP for the demineralized storage tank. The staff believes that the water in the tank is secondary water that is controlled by the secondary water chemistry program. Is the water in this tank primary or secondary water for Plant Y?

    Response: *There is an error in Table 3.4-2 for the Demineralized Water Storage Tank chemistry program. The tank contains secondary water that is controlled by the Secondary Chemistry Monitoring Program, which should have been referenced in Table 3.4-2.*

14. In Section 3.4.3 of the LRA, the generic NRC communications are listed that have been reviewed for operating experience related to SPCS. The list does not contain the following two information notices:
    A) NRC Information Notice 91-18, Supplement 1, High-Energy Piping Failures Caused by Wall Thinning, December 18, 1991.
    B) NRC Information Notice 97-84, Rupture in Extraction Steam Piping as a Result of Flow-Accelerated Corrosion, December 11, 1997.

    Were these two documents included in the review? If so, address the impact of excluding these documents in the integrated plant assessment.

    Response: *Information Notice 91-18 is included in Section 3.4.3.1. This listing includes a review of all Supplements. Information Notice 97-84 was inadvertently excluded from the list. Exclusion of this document has no impact on the integrated plant assessment.*

15. Table 3.4-3 of the LRA states that the auxiliary feedwater system is cast iron. The staff believes that cast iron may be subject to loss of material due to selective leaching. Provide the basis for concluding that loss of material due to selective leaching for AFW cast iron components is not an AERM.

    Response: *As described in Appendix C, the aging effect "Loss of Material" in Table 3.4-3 can be the result of several aging mechanisms (i.e. general corrosion, pitting corrosion, selective leaching, etc.). For these cast iron components, "Loss of Material" does include selective leaching.*

    Comment: The Plant Y LRA demonstration did not include an Appendix C description of the process for identifying aging effects requiring management for non-class 1 components.

16. External environments for which applicable aging effects have been identified in the plant Y LRA include the atmospheric air and leakage. The leakage environment is created when fluids escape from their system boundaries (usually from bolted closures) and contact the external surfaces of adjacent components. The fluid in leakage environments of concern is typically borated, treated, or raw water. In the LRA, the only leakage environment identified is borated water leakage. Discuss the operating experience for leakage of treated or raw water onto plant components.

    Response: *As described in Appendix C, fluid leakage is considered an event driven condition and not a normal operating condition. Other than borated water leaks, fluid leakage is not considered in the aging management review process. This is consistent with the external environments identified in NUREG-1801.*

    Comment: The Plant Y LRA demonstration did not include an Appendix C description of the process for identifying aging effects requiring management for non-class 1 components.

17. AMPs for the SPCS are summarized in Section 3.4.4 of the LRA. However, the first AMP on the list, auxiliary feedwater pump oil coolers inspection is not referred to in the corresponding AMR results tables (Table 3.4-1,3.4-2, or 3.4-3). Similarly, the primary water chemistry monitoring program which is referred to in Table 3.4-2, is not in the Section 3.4.4 list. Address these inconsistencies.

    Response: *The Auxiliary Feedwater Pump Oil Coolers Inspection is identified in Table 3.4-3 for the auxiliary feedwater pump lube oil cooler and governor oil channels and covers. The Primary Chemistry Monitoring Program identified in Table 3.4-2 is incorrect; the Secondary Chemistry Monitoring Program is the appropriate program.*

18. The applicant states that any follow-up inspection required will be based on the evaluation of the inspection results and will be documented in accordance with the corrective action program in accordance with 10 CFR 50, Appendix B. The AMP in Appendix B of the LRA does not explicitly commit to 10 CFR 50, Appendix B to address corrective action, confirmation process, and administrative control of nonsafety related components. Please indicate whether the AMP incorporates these elements. Also, are there any of the steam and power conversion system components within the scope of license renewal that are nonsafety related? If so, confirm that these nonsafety related components will be covered by a corrective action program consistent with 10 CFR 50 Appendix B?

    Response: *The steam and power conversion system does include components within the scope of license renewal that are non-safety related and the AMP incorporates the elements of 10 CFR 50, Appendix B for these components. Non-safety related components are included within the scope of the Plant Y 10 CFR 50, Appendix B corrective action program.*

19. For field erected tanks, are portions of the tanks in contact with the ground? Industry operating experience indicates that tanks in contact with the ground are subject to loss of material. If Plant Y tanks are in contact with the ground, address the basis for concluding they are not subject to loss of material.

Response: *No plant specific experience has been identified for portions of field erected tanks in contact with the ground. Unless these areas are wetted, no aging effects are anticipated.*

RAIs FOR PLANT Y
SECTION 3.5: CONTAINMENT, STRUCTURES, AND COMPONENT SUPPORTS

1. Section 3.5 is titled Structures and Structural Components, subsection 3.5.1 is titled Containments, and subsection 3.5.1.1 is titled Containment Structure Concrete Components. The table entries for component/commodity group in Table 3.5-2, referenced by Section 3.5, covers additional concrete components (beyond containment) such as floor slabs, missile shields, equipment pads, etc. which are not addressed in subsection 3.5.1.1. As a result, it is not clear what structures and structural components are intended to be included in this demonstration (containment concrete components, steel components of containment, prestressing system components, containment internal structures, other building structures, masonry walls, etc.). Explain the intended scope of components in this demonstration and any inconsistency between the information provided in subsection 3.5.1.1 and Table 3.5-2. If the intended scope covers more than containment concrete components, then provide a review of the aging effects and the applicable AMPs. The introductory paragraphs of Section 3.5 discuss two (2) aging management programs credited for managing aging effects of inaccessible structural components. The two programs are the ASME Section XI, Subsection IWE inservice inspection (ISI) program and the structures monitoring program. The staff believes that a discussion of aging effects and associated aging management programs (AMPs) related to inaccessible areas should not be described in the introductory/lead in section.

   ***Response**: Only a small sample of LRA sections and plant components are provided in the demonstration. In a complete LRA, Section 3.5 would include all structures and structural components at Plant Y, subsection 3.5.1 would include all structures and structural components associated with the containment structure (both the external structure and the internal structures), subsection 3.5.1.1 would include only those concrete components of the containment structure (external structure), and Table 3.5-2 would include all the structural components and commodities for Plant Y.*

   Comment: Section 3.5 is the general introduction for all plant structures. The Containment aging management review results are presented in Section 3.5.1. The aging management review results for other structures would be presented in a subsequent section of a complete LRA. Since inaccessible areas could apply to numerous structures, it is best to discuss the topic in the general Section 3.5.

2. The LRA Section 3.5 (third paragraph) lists several structural components which require aging management but are inaccessible for visual inspection. These include buried concrete, embedded steel, and structural components blocked by installed equipment or structures. It is not clear what structural components this paragraph addresses. For example, is the paragraph referring to containment concrete components, containment steel elements, prestressing systems, or containment internal structures? In addition, the LRA states that structural components inaccessible for inspection are managed by inspecting accessible structures with similar materials and environments for aging effects that may be indicative of aging effects for inaccessible structural components. From the information provided it is not apparent how visual inspection of accessible areas of concrete would be indicative of aging degradation of buried concrete surfaces and whether this approach is sufficient for embedded steel. Also, Section 3.5 of the LRA states that the programs

credited for managing aging effects of inaccessible structural components are the ASME Section XI, Subsection IWE ISI Program and the Structures Monitoring Program. ASME Section XI, Subsection IWE does not apply to concrete components of containment. 10 CFR 50.55a clearly states that the ASME Section XI, Subsection IWL should be used for examination of concrete components of containments and also specifies additional provisions beyond the requirements of Subsection IWL.

Based on the above discussion, describe what structural components are included in the third paragraph of Section 3.5 regarding inaccessible structural components, and provide the justification of the approach presented in Section 3.5 for managing aging effects of structural components in inaccessible areas. This should include an explanation of aging management for inaccessible areas when conditions in accessible areas may not indicate the presence of or result in degradation to such inaccessible areas.

***Response**: The third paragraph of Section 3.5 refers to all inaccessible structural components in the scope of license renewal. Aging management for inaccessible structures should be plant specific based on the material, environment, and configuration; therefore, justification of the approach should be plant specific.*

3. LRA subsection 3.5.1 lists the containment structure concrete components as containment dome, cylinder wall, floor, and foundation mat. Explain why the containment ring girder and buttresses are not listed.

   ***Response**: The containment ring girder and buttresses are considered part of the containment dome and walls.*

4. LRA subsection 3.5.1.1.1, titled "Materials and Environment," states that "The codes and standards used for design and fabrication of the containment structure components are provided in Plant Y UFSAR subsections 5.1.2 and 5.1.6. These materials and the testing of these materials, are consistent with the GALL Report." This statement should be clarified because the GALL Report does not specify materials and testing of materials for the containment structure components. Explain the purpose and the meaning of the LRA statement.

   ***Response**: This statement refers to the codes and standards listed in GALL (e.g., ACI 201.2R-77 in Item IIA1.1-b, ASTM C295-54 in Item IIA1.1-d, ACI 349-85 or ACI 318-63 in Item IIA1.1-e).*

5. LRA subsection 3.5.1.1.2 is titled "Aging Effects Requiring Management." It lists three (3) aging effects that are applicable to containment concrete components which require aging management. The LRA indicates that these AERMs, which are consistent with the GALL Report, apply to the concrete below groundwater elevation for the cylinder walls and foundation mat. From the information provided in subsection 3.5.1.1.2 in the LRA it cannot be determined why loss of material due to corrosion of embedded steel and cracking due to corrosion of embedded steel should be limited to locations below groundwater elevation and limited to cylinder walls and foundation mat. Provide the technical basis why these two AERMs should be limited to below groundwater elevation and limited to cylinder walls and foundation mat.

***Response**: The AERMs are limited to below groundwater concrete because only the concrete structures below groundwater are potentially exposed to aggressive chemicals (i.e., the groundwater). The AERMs are limited to the cylinder walls and the foundation mat since these are the only containment concrete structures potentially exposed to the groundwater.*

6. LRA subsection 3.5.1.1.2 also did not evaluate the loss of bond between the concrete and steel due to steel corrosion as an aging effect. If this aging effect is applicable, provide a description of an AMP. If not, provide the justification for concluding that this aging effect is not applicable.

   ***Response**: Loss of bond between the concrete and steel due to steel corrosion is a subsequent effect that is enveloped by the initial effect loss of material due to corrosion of embedded steel. At Plant Y, loss of material due to corrosion of embedded steel is an AERM that will be managed by the Structures Monitoring Program.*

7. LRA subsection 3.5.1.1.2 indicates that the aging effects of loss of material and cracking due to freeze-thaw based on the climate at the plant which is stated to be subtropical with long, warm summers accompanied by abundant rainfall and mild, dry winters with negligible freeze-thaw cycles are not applicable. This description is somewhat subjective (e.g., negligible freeze-thaw cycles) and prevents the staff from making a reasonable assurance finding. Provide quantitative information such as the weathering index for the site which would demonstrate that this aging effect is not applicable.

   ***Response**: The description of weather conditions comes from the Plant Y UFSAR. The Plant Y UFSAR does not include a weathering index. Based on subtropical climate at Plant Y, it is reasonable to conclude that loss of material due to freeze-thaw is not an AERM. However, a LRA for a plant exposed to severe weather conditions could provide a weathering index.*

8. LRA subsection 3.5.1.1.2 indicates that the aging effect of change in material properties (increase in porosity and permeability) due to leaching of calcium hydroxide based on the statement "Plant Y concrete structures and concrete components are constructed of dense, well-cured concrete, with an amount of cement suitable for strength development, and achievement of a water-to-cement ratio that is characteristic of concrete having low permeability are not applicable. This is consistent with the guidance provided by the ACI...." The meaning of the word dense is not clear and should be defined. The reference to guidance provided in ACI should be expanded to identify which ACI codes and standards were used. Indicate whether the concrete components were constructed in accordance with the guidance provided in ACI 201.2R-77 which is one acceptable approach the staff has found exists to assure adequate concrete characteristics. Alternatively, provide quantitative information which would demonstrate the concrete has the characteristics described above.

   ***Response**: The term "dense" relating to concrete is used with the same meaning intended by the Staff in GALL April 2001 (Item IIA1.1-b). The recommendation to identify specific ACI codes and standards could be incorporated in an actual LRA.*

9. LRA subsection 3.5.1.1.2 indicates that the aging effects of expansion and cracking due to reaction with aggregates based on the use of non-reactive aggregates whose acceptability was established using industry standards and ASTM tests are not applicable. Indicate whether investigations, tests, and petrographic examinations of aggregates were performed in accordance with ASTM C295-54 or ASTM C227-50 to demonstrate that this aging effect is not applicable. If not, then provide the justification for concluding that this aging effect is not applicable.

   ***Response**: Detailed justification for concluding that cracking due to reaction with aggregates based is not an AERM is contained in the Plant Y Aging Management Review documents. These documents are available for inspection at Plant Y.*

10. LRA subsection 3.5.1.1.2 indicates that the aging effects of cracks, distortion, and increase in component stress level due to settlement on the basis that Plant Y concrete structures are founded on fossiliferous limestone bedrock with crushed fill are not applicable. The LRA states that this foundation material is suitable for foundations systems with no significant structural settlement expected. It is not clear whether the prior statement means that the concrete structures are founded on bedrock. If not, then explain why settlement is not an applicable aging effect.

    ***Response**: The statement means the plant is built on crushed limestone (engineered fill) which was placed on limestone bedrock. The absence of plant specific history of any settlement problems is very strong evidence that settlement is not an aging effect requiring management (see GALL Section IIA1.1-f).*

11. LRA subsection 3.5.1.1.2 indicates that the aging effect of loss of strength and modulus due to elevated temperatures is not applicable on the basis that the hot piping penetrations were designed and constructed to maintain concrete components below the degradation threshold and localized temperature limits of the ACI standards without forced ventilation. The LRA also indicates that no other containment structure concrete components are exposed to elevated temperature. Provide the general temperature limit corresponding to the degradation threshold and localized temperature limit referred to in the above statement. Since the aging effects due to elevated temperatures probably would not be identified by visual inspection, except under extreme conditions, what data is available to demonstrate that the general and local temperatures during operation of the plant have not exceeded the specified temperature limits?

    ***Response**: The temperature limits are >150°F general and >200°F local per GALL IIA1.1-h. Containment temperatures are limited by Technical Specifications to 120°F and local temperatures are limited by design.*

12. LRA subsection 3.5.1.1.3 describes a review of industry operating experience and plant specific operating experience. This review included a survey of Plant Y non-conformance reports, licensee event reports, and condition reports for any documented instances of containment structure concrete component aging and interviews with responsible engineering personnel. Based on these reviews, the LRA concludes that "no aging effects requiring management were identified from this review beyond those identified in subsection 3.5.1.1.2." This conclusion does not appear to be consistent with some of the reference

documents cited in subsection 3.5.1.1.3. As an example, NUREG-1522 has identified aging effects beyond those identified in subsection 3.5.1.1.2 where degradation has occurred and some of these areas would warrant aging management. In addition, no plant-specific operating experience with aging of concrete components has been described in the LRA. Therefore, describe instances of accessible and inaccessible concrete aging degradation observed at Plant Y even if they have been identified as "not requiring aging management." The description of degradation occurrences should include results from the reviews of the non-conformance reports, licensee event reports, and condition reports as well as interviews with responsible engineering personnel.

***Response**: Detailed plant history is contained in the Plant Y Aging Management Review documents. These documents are available for inspection at Plant Y.*

13. LRA subsection 3.5.1.1.4 concludes that the aging effects requiring management for containment are adequately managed by the "Structures Monitoring Program." It also states that the "Structures Monitoring Program (which is described in Appendix B) is in agreement with the GALL report in that it is being modified to include a plant specific approach to inspections of inaccessible areas." As noted in the Structures Monitoring Program XI.S6 of the GALL report, it "...applies only to structures and structural components and applicable aging effects that are not addressed by the AMPs described in Sections XI.S1 thru XI.S4 and XI.S7; i.e., this AMP cannot be substituted for any of the five (5) specified AMPs." This means that the structures monitoring program cannot be substituted for the containment ISI program. However, the LRA credits the structures monitoring program for containment and this is inconsistent with the GALL report. Explain why the structures monitoring program is being credited for containment.

***Response**: GALL (Item IIA1.1-e) says IWL is an acceptable program for accessible areas (exterior above grade) and a plant specific aging management program is required for inaccessible areas (exterior below grade). The structures monitoring program is the plant specific program for Plant Y. In addition, the quoted restriction on the applicability of the structures monitoring program has been deleted in the current GALL (April 2001).*

14. LRA Section 3.5 (introductory paragraph) utilizes the term "component and commodities" and Table 3.5-2 titled "Containments," uses the term component/commodity group for the heading of the first column. The entries in Table 3.5-2 under this table heading consist of various containment components and other structural components. Since the use of the term "commodity" is not clear, explain what is the definition and purpose of this term and how is it different than structural "component."

***Response**: The term "component" refers to a unique item (e.g., pressurizer support or containment sump); whereas the term "commodity" refers to a group of similar components (e.g., cable trays or whip restraints). The term "commodity" is used to group like components into a single line item in the 6-column table. The component/commodity concept is introduced in the Scoping and Screening Results that is presented in Section 2 of the LRA.*

Comment: The Plant Y LRA demonstration did not include Section 2 of the LRA.

15. The structures monitoring program in the LRA, Appendix B, indicates that the program is credited for managing the effects of loss of material for selected structures within the scope of license renewal. It does not include the other aging effects (cracking and change in material properties) that have been identified in subsection 3.5.1.1.2. Explain the inconsistency between the structures monitoring program described in Appendix B and the aging effects described in subsection 3.5.1.1.2.

***Response**: The other aging effects (cracking and change in material properties) were inadvertently omitted from the Structures Monitoring Program in Appendix B.*

16. The structures monitoring program in Appendix B describes, under the heading operating experience, inspections that have been performed for the containment and other structures in 1996 and 1997, and in 1999 and 2000. The LRA states that no significant deterioration has been identified in the inspections performed. Describe instances of degradation observed during these two inspection periods for the containment structural components.

***Response**: Detailed plant history is contained in the Plant Y Aging Management Review documents. These documents are available for inspection at Plant Y.*

17. The structures monitoring program in Appendix B states that "With identified enhancements, the Structures Monitoring Program is consistent with the ten attributes identified in the NRC GALL report (August 2000 DRAFT) for Structures Monitoring Program XI.S6." Provide a description what is meant by "identified enhancements."

***Response:** The identified enhancements were inadvertently not identified. The program will be enhanced by modifying the scope of specific inspections and improving documentation requirements.*

18. LRA Table 3.0-2 indicates that under external service environments borated water leaks can occur. If steel components are within the scope of the demonstration, then describe how this condition is being managed.

***Response**: The steel components that could be affected by borated water leaks were not included in the scope of this demonstration.*