February 28, 2003

LICENSEE: South Carolina Electric and Gas Company

FACILITY: V. C. Summer Nuclear Station

SUBJECT: SUMMARY OF THE MEETING BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF AND SOUTH CAROLINA ELECTRIC AND GAS COMPANY REPRESENTATIVES TO DISCUSS THE V. C. SUMMER NUCLEAR STATION (VCSNS) LICENSE RENEWAL APPLICATION (LRA)

On January 8, 2003, the NRC staff met with members of South Carolina Electric & Gas Company (SCE&G) in a public meeting to discuss staff's draft request for additional information (RAI) questions on Sections 3.5 and 4.5 of the VCSNS LRA. The list of attendees for the meeting is provided in Enclosure 1.

The purpose of the meeting was to discuss and clarify the staff's draft RAI questions on Sections 3.5 and 4.5 of the VCSNS LRA related to aging management of containment, structures, and component supports. The NRC staff also discussed other draft RAI questions related to boric acid corrosion surveillance, service water system reliability and in-service testing programs.

In a working session, the NRC and contractor staff from Brookhaven National Laboratory (BNL) discussed the draft RAI questions previously provided to the Applicant (enclosure 2). The discussion covered a number of civil and structural questions related to (i) Aging Management of Containment, Structures, and Component Supports and, (ii) Concrete Containment (Reactor Building) Tendon Pre-Stress Analysis. The following topics were discussed.

- Aging Management program (AMP) related to loss of materials for components in reactor, auxiliary, intermediate and fuel handling buildings.
- Crediting Aging Management Programs for concrete in anchors and embedments
- Coating Management Program for Containment liners
- Language in Final Safety Analysis Report Supplement
- Bolting Integrity Program

The staff also discussed other structural items including the fill concrete in the auxiliary building, the retaining wall around the reactor building and the north berm earthen embankment. The staff discussed if any construction information could be made available from as-built drawings to determine their structural intended function. These and other staff questions will be suitably incorporated into the final RAI to be issued to VCSNS in April 2003.

Regarding draft RAI question 3.5-26, the licensee clarified that the damage was "physical" (man-made) rather than due to any active degradation mechanism, and the staff agreed to drop the RAI.

There were no members of the public present during the meeting.

A draft of this meeting summary was provided to the applicant to allow them the opportunity to comment prior to the summary being issued.

/**RA**/

Ram Subbaratnam, Project Manager
License Renewal Section
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Program
Office of Nuclear Reactor Regulation

Docket No.: 50-395

Enclosures: As stated

cc w/enclosures: See next page

A draft of this meeting summary was provided to the applicant to allow them the opportunity to comment prior to the summary being issued.

/***RA***/

Ram Subbaratnam, Project Manager
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SOUTH CAROLINA ELECTRIC & GAS COMPANY
JANUARY 8, 2003

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Draft Request for Additional Information (RAI)
V. C. Summer Nuclear Station License Renewal Application
Section 3.5, "Aging Management of Containments, Structures, and Component Supports"
and
Section 4.5, "Concrete Containment (Reactor Building) Tendon Pre-Stress Analysis"

RAI 3.5-1
In Report TR00170-003, Revision 0, Attachment II: Aging Management Review Results for Structures and Structural Components, cable trays, conduit, electrical and instrument panels and enclosures are identified as component types within most of the buildings and structures. These components are identified as steel in an internal environment, except for the Electrical Substation and Transformer Area, where the environment is external. In all cases, no aging effect requiring aging management is identified. The staff believes that these components located in the reactor, auxiliary, intermediate, and fuel handling buildings are susceptible to boric acid corrosion and that these components located in an external environment are susceptible to environmental corrosion. Therefore, in both cases loss of material is an applicable aging effect requiring aging management. The applicant is requested to identify and describe the aging management programs which will manage loss of material for these components located in the reactor, auxiliary, intermediate, and fuel handling buildings, and in an external environment.

RAI 3.5-2
Many concrete component types in internal, external, and below-grade environments are identified in Report TR00170-003, Revision 0, Attachment II as having no aging effects requiring aging management. The specific component types are duct banks; equipment pads; flood curbs; foundations; hatches; missile shields; reinforced concrete-beams, columns, floor slabs, walls; roof slabs; sumps; caissons; piers; trenches; jet barriers; and manholes. The staff position is that all accessible concrete components that perform an intended function require aging management for loss of material, cracking, and change in material properties; and that inaccessible concrete components (i.e., below grade) also require aging management unless specific criteria defined in NUREG-1801 GALL Volume 2 are satisfied, to demonstrate a non-aggressive below-grade environment. Therefore, the applicant is requested to:

(i) identify the aging management programs which will manage loss of material, cracking, and change in material properties for all concrete components in accessible areas;
(ii) submit a quantitative assessment of the below-grade environment that demonstrates it is non-aggressive, in accordance with the specific criteria defined in GALL Volume 2, and describe the groundwater monitoring program that will be implemented to verify that the below-grade environment remains non-aggressive, including monitoring frequency and consideration of seasonal fluctuations;
(iii) if the below-grade environment is aggressive, in accordance with the specific criteria defined in GALL Volume 2, describe in detail the plant-specific aging management programs for inaccessible concrete components.

RAI 3.5-3
Report TR00170-003, Revision 0, Attachment II does not list containment hatch O-rings or fire/flood door seals as separate components. Therefore, there is no documented aging management review. Since these components are passive and are typically replaced only upon

identification of a degraded condition, they require an aging management review. Therefore, the applicant is requested to submit its aging management review for these components, including a description of the aging management programs that will be relied upon to ensure there is no loss of intended function during the period of extended operation.

RAI 3.5-4
In Report TR00170-003, Revision 0, Attachment II, three (3) steel components in an concrete environment are listed. These are anchorage, anchorage/embedments (exposed surfaces) and embedments. All are identified as having no aging effects requiring aging management. The condition of the concrete surrounding anchorage and embedments may affect their load capacity. GALL Volume 2, III.B, Item Numbers III.B1.1.4, III.B1.2.3, III.B2.2, III.B3.2, III.B4.3, and III.B5.2 specifically identify the need for aging management of the concrete surrounding expansion and grouted anchors, and grout pads for support base plates. Localized concrete degradation may have an insignificant effect on the overall structure integrity, but may have a very significant effect on the anchor capacity. The staff position is that all accessible concrete requires aging management; this includes monitoring the condition of concrete surrounding anchorages and embedments. Therefore, the applicant is requested to submit its detailed aging management review for anchorage and embedments, including a description of the aging management programs that will be relied upon to manage this aging effect.

RAI 3.5-5
In Report TR00170-003, Revision 0, Attachment II, for pipe supports located in the auxiliary building; control building; intermediate building; diesel generator building; fuel handling building; reactor building; and service water structures, loss of material is identified as the only aging effect requiring aging management. The ASME Section XI ISI Program - IWF is identified as one of the credited aging management programs, presumably for ASME Class piping supports. Attachment II indicates that this is a match with GALL. The staff notes that this is not a match with GALL, because GALL Volume 2, III.B, Item Numbers III.B1.1.3 and III.B1.2.2 also identify loss of mechanical function as an aging effect to be managed by IWF. Therefore, the applicant is requested to revise Attachment II and the license renewal application (as appropriate) to include loss of mechanical function as an applicable aging effect for ASME Class piping supports, and to credit IWF as the applicable aging management program. Alternatively, submit a detailed technical basis for excluding this aging effect and clearly identify this as a deviation from GALL.

RAI 3.5-6
In the "Aging Management Programs" column of the Report TR00170-003,Revision 0 Attachment II Tables, Technical Specification 3/4.9.10 is listedfor the fuel transfer canal liner plate, spent fuel pool liner, and spent fuel storage rack in the fuel handling building; and Technical Specification 3/4.6.1 is listed for personnel airlock, escape hatch, and equipment hatchin the reactor building. The staff requests the applicant to describe theobjective, scope, and implementation procedures of each technical specification, as it relates to aging management for license renewal.

RAI 3.5-7
In LRA Section 3.5.1.2, the applicant has identified that the foundation for the auxiliary building extends below the groundwater level and is supported on fill concrete down to competent bedrock. However, the applicant did not identify whether underdrain (de-watering) systems are

utilized at V. C. Summer for the auxiliary building and/or any of the other buildings in the license renewal scope. In addition, no intended function(s) have been identified for the fill concrete used under several of the buildings included in the license renewal scope. Therefore, the staff requests the applicant to submit the following information related to underdrain systems and fill concrete:

(i) Identify whether underdrain (de-watering) systems are utilized at V. C. Summer.
(ii) If utilized, describe the specific applications; describe current monitoring and/or maintenance activities that ensure proper functioning; discuss whether they perform an intended function; and, as appropriate, submit an aging management review, including identification of credited aging management program(s).
(iii) Discuss whether fill concrete performs an intended function; and, as appropriate, submit an aging management review, including identification of credited aging management program(s).

RAI 3.5-8
In LRA Table 3.5-1, AMR item 19, the applicant credits the Chemistry Program (LRA Appendix B.1.4) for aging management of the stainless steel, spent fuel pool liner. The staff considers verification of the effectiveness of a chemistry control program to be an integral element of aging management. For the spent fuel pool, this is readily achieved by monitoring an existing plant-specific, spent fuel pool leak detection system or by monitoring the spent fuel pool water level for indications of leakage. Therefore, the staff requests the applicant to describe its plant-specific operating experience concerning leaks in the spent fuel pool, including a description of each occurrence, how it was detected, the determination of root cause, and how it was remedied.

RAI 3.5-9
LRA Table 3.5-2 is titled “Summary of Aging Management Programs for Station Containment, Other Structures and Component Supports That are Different From or Not Addressed in NUREG-1801 but are Relied on for License Renewal.” Ten (10) AMR items are listed in the table. For each AMR item, the following information is provided in the table: component type, material, environment, aging effect / mechanism, program activity, and discussion. The staff’s review of LRA Table 3.5-2 identified the need for clarification and additional information relating to a number of the AMR items. For all except one (1) of these items, additional pertinent information has either been requested in other RAIs or was located in Attachment II to Report TR001700-003. The exception is LRA Table 3.5-2, AMR item 4: “Lubrite Plates (Class 1 Pipe Hanger Supports).” It is identified as a lubricant material in an internal environment. No aging effect / mechanism is identified, and consequently no aging management program is identified. In the “Discussion” column, the applicant provided a brief summary of its aging management review, which concluded that lubrite plates “are not susceptible to aging effects requiring management.” Aging management of lubrite plates for Class 1 piping supports is addressed in NUREG-1801, GALL Volume 2, III.B, Item No. III.B1.1.3. ASME Section XI, subsection IWF is identified as the applicable aging management program. Therefore, the applicant is requested to submit a detailed technical basis to support its conclusion that lubrite plates do not require aging management, or revise its aging management review for lubrite plates to be consistent with GALL.

RAI 3.5-10

LRA Table 3.5-1 is titled "Summary of Aging Management Programs for Station Containment, Other Structures and Component Supports Evaluated in NUREG-1801 That are Relied on for License Renewal." Twenty-nine (29) AMR items are listed in the table. For each AMR item, the following information is provided in the table: component group, aging effect / mechanism, aging management program, further evaluation required, and discussion. This table is a reproduction of NUREG-1800 Table 3.5-1, with an added "Discussion" column. LRA Table 3.5-1 does not indicate that the applicant's aging management reviews are consistent with GALL. In the "Discussion" column, the applicant refers to aging management programs that are "consistent with those reviewed and approved in NUREG-1801." For most of the AMR items, the aging management review is not consistent with GALL. The staff's review of LRA Table 3.5-1 identified the need for clarification and additional information relating to many of the AMR items. For many of these items, additional pertinent information has either been requested in other RAIs or was located in Attachment II to Report TR001700-003. The applicant is requested to submit the following additional information or clarifications related to LRA Table 3.5-1:

(i) For AMR items 1 and 2, describe how the design basis for the flat plate containment penetration closures considered cyclic loading due to temperature/pressure transients. If a CLB fatigue analysis exists for the flat plate penetration closures, has it been updated for a 60-year operating life? How will cracking due to cyclic loading be managed for the period of extended operation?

(ii) For AMR item 8, clarify the reference to three (3) aging management programs in the "Discussion" column, considering that the containment foundation is not subject to settlement.

(iii) For AMR item 15, clarify the reference to three (3) aging management programs in the "Discussion" column, considering that freeze-thaw and reaction with aggregates are dispositioned as not requiring aging management for both accessible and inaccessible areas.

(iv) For AMR item 16, explain the reference to two (2) aging management programs that are only applicable to the containment structure.

(v) For AMR item 24, explain the following statement in the "Discussion" column: "Note that the combinations of components, materials, and environments identified in NUREG-1801 for Group 8 (Steel Tanks) are not applicable to VCSNS; therefore, aging management is not required." Do any steel tanks have stainless steel liners? If so, how are stress corrosion cracking and crevice corrosion managed?

(vi) For AMR item 25, clarify which listed subcomponents are managed by each of the two (2) referenced aging management programs. Also identify which, if any, of the subcomponents do not require aging management, based on the plant-specific aging management review.

(vii) For AMR item 28, explain why ASME Section XI, subsection IWF is not credited for aging management of the ASME Class supports, consistent with GALL. How are the two (2) referenced aging management programs implemented as a substitute for IWF?

RAI 3.5-11

LRA Section 3.5.1.1 indicates that the reactor building foundation mat bears on fill concrete that extends to competent rock. A retaining wall, extending approximately one-quarter of the way around the reactor building, protects the below grade portions of the reactor building wall from the subgrade. LRA Section 2.4.1 indicates that the retaining wall protects the below- grade

portions of the reactor building wall from the subgrade and groundwater. The groundwater at VCSNS has been identified as being mildly acidic but considered to be not aggressive in LRA Table 3.5-1. No quantitative information is provided in the LRA Section 3.5 to justify this conclusion. Therefore, the following information is requested:

(i) Identify the intended function(s) for the retaining wall, or provide the technical basis why it serves no intended function.
(ii) Provide the aging management review for the retaining wall, if it serves any intended function.

RAI 3.5-12
AMR items 7 and 15 of LRA Table 3.5-1 indicate that only certain aging effects of concrete containment require aging management. As an example, for accessible exterior portions of the reactor building concrete containment, only change in material properties due to leaching requires aging management in accordance with the Containment ISI Program - IWE/IWL. For inaccessible areas, sufficient information (specific standards and quantitative data) was not provided to clearly demonstrate that containment concrete aging effects do not require aging management. Therefore, the following information is requested for containment concrete components:

(i) For all accessible containment concrete components, demonstrate that cracking, loss of material, and change in material properties will be managed in accordance with NUREG-1801, XI.S2, ASME XI, Subsection IWL.
(ii) For all inaccessible containment concrete components, describe the plant-specific aging management programs which will manage aging unless it is clearly demonstrated that the non-significance conditions specifically described in the NUREG-1801 apply.

RAI 3.5-13
In Report TR00170-003, Rev. 0, Attachment II, many structural components are identified as not having any applicable aging effects and thereby no aging management programs are specified in the “Aging Management Programs” column. Most of these structural components are concrete, which the staff addresses in RAI 3.5-2. For several stainless steel components in the reactor building (refueling canal liner plate, sump screens, and sumps), a statement in the “Notes” column indicates that although no aging effects have been identified, the Maintenance Rule Structures Program inspects these components. Please explain the intent of this statement. Is the Maintenance Rule Structures Program being credited to manage aging of these components for license renewal?

RAI 3.5-14
AMR item 10 in LRA Table 3.5-1 addresses the aging effect of reduction in strength and modulus due to elevated temperature for concrete elements of containment. The discussion column of this item states that “The VCSNS containment concrete elements are not exposed to temperatures which exceed the thresholds for degradation; therefore, reduction of strength and modulus due to elevated temperatures are not aging effects requiring management. This statement does not seem to be consistent with the information presented in Report TR00170-003, Rev. 0, Table 6.1-1 and discussion on page 59 of 224. The table indicates that there is one region (above the reactor head but below the operating floor elevation 463') that has a maximum temperature of 157° F. Page 59 of the report also indicates that the control rod drive

mechanism (CRDM) is maintained at a temperature of less than or equal to 170° F. The report concludes that these temperatures are localized and do not exceed 200° F. The report follows with some additional discussion about elevated temperature concerns for three areas inside the reactor building. Some design modifications were made to rearrange air flow in the reactor building and tests were made in which the inspector identified no further problems. From this information it is not clear how many regions still have temperatures above 150° F and how the aging effects due to elevated temperatures above 150° F will be managed. Therefore, provide the following information:

(i) Explain the inconsistency between the statement made in LRA Table 3.5-1, AMR item 10 and the information in Report TR00170-003, Rev. 0, Table 6.1-1 (see above discussion).
(ii) For all structures in the scope of license renewal, identify all regions that currently have temperatures in excess of 150° F.
(iii) How will aging effects due to elevated temperatures above 150° F be managed during the period of extended operation?
(iv) What is the meaning of the phrase “the inspector identified no further problems” following design modifications to rearrange air flow in the reactor building?

RAI 3.5-15
AMR item 12 in LRA Table 3.5-1 discusses loss of material due to corrosion in accessible and inaccessible areas of the containment liner. For inaccessible areas, the LRA concluded that corrosion in the embedded containment liner is not significant because the four conditions described in NUREG-1801 are applicable to VCSNS. The staff notes that the plant-specific operating experience does not necessarily support this conclusion. LRA Appendix B.1.12.1, states that rust was identified on the reactor building liner plate adjacent to the moisture barrier and the moisture barrier had degraded. Therefore, it is not evident that loss of material due to corrosion in inaccessible areas of the containment liner is not significant at VCSNS. Provide the following additional information:

(i) What inspections have been conducted to assess the condition of the liner embedded in the concrete base?
(ii) Did the observed degradation occur before or after the implementation of the six (6) aging management programs (identified in AMR item 12) credited to preclude such degradation?
(iii) Since this type of degradation has already occurred, what is the technical basis for concluding that it could not occur again?

RAI 3.5-16
LRA Table 2.4-2 indicates that the aging management review results for numerous components of the reactor building (such as containment liner plate, cable tray, conduit, electrical and instrument panels and enclosures, fire doors, flood curbs, and HVAC duct supports), are presented in LRA Table 3.5-1, AMR item 13. LRA Table 3.5-1, AMR item 13 covers the component group “Steel elements; protected by coating,” and GALL identifies the aging management program as “Protective coating monitoring and maintenance.” AMR item 13 lists four aging management programs in the “Discussion” column. These are the 10 CFR 50 Appendix J General Visual Inspection, Containment Coating Monitoring and Maintenance Program, Containment ISI Program - IWE/IWL, and Maintenance Rule Structures Program. However, Report TR00170-003, Rev. 0, Attachment II, does not credit a coating monitoring and maintenance program for these components, except for the containment liner plate. Because of

these inconsistencies and the grouping of so many components together within AMR item 13, it is not clear which aging management programs are being credited for which components. Therefore, clarify the following items:

(i) Table 3.5-1, AMR item 13 covers the component group “Steel elements; protected by coating.” Are all components that reference AMR item 13 protected by coatings that are managed by a coating monitoring and maintenance program? If not, revise the LRA Table 2.4-2 “Aging Management Review Results” column.
(ii) Since the four listed aging management programs cannot apply to all components in AMR item 13, identify which VCSNS aging management programs apply to which group of components.

RAI 3.5-17
For the containment post-tensioning system, Report TR00170-003, Rev. 0, Attachment II, identifies loss of material and loss of prestress as the aging effects requiring management, and the Tendon Surveillance Program as the applicable aging management program; the match with GALL is specified as “partial”. LRA Table 3.5-1, AMR items 14 and 11 respectively address the same aging effects for the post-tensioning system, and identify the Containment ISI Program - IWE/IWL and the Tendon Surveillance Program as the applicable aging management programs. Both aging management programs are identified as consistent with GALL. To clarify this apparent contradiction, explain what is meant by a partial match in Report TR00170-003, Rev. 0, Attachment II. Also submit the technical basis for any deviations from the GALL programs that manage aging of the post-tensioning system (i.e., GALL XI.S2 and X.S1) .

RAI 3.5-18
LRA Table 3.5-1 AMR items 1, 2, and 3 discuss bellows used in containment penetrations and conclude that stress corrosion cracking (SCC) is not an applicable aging effect requiring management. The discussion under these AMR items indicates that the penetration bellows are not part of the containment pressure boundary because they are located on the exterior side of containment and hot penetrations are sealed on the inside of containment by a flat plate welded to both the penetration sleeve and process pipe. LRA Table 3.5-1, AMR item 2 states that the hot penetrations bellows “provide structural and/or functional support for process piping on the outboard side of containment; therefore, in the unlikely event of SCC in the bellows, the intended functions are not affected.” While the intended function for containment pressure boundary may not be affected, failure of the bellows would affect other intended functions. In addition, AMR items 2 and 3 credit the Appendix J General Visual Inspection, Appendix J Leak Rate Testing, and Containment ISI Program - IWE-IWL as aging management programs; these programs are only applicable to the welded flat plate closures, if the penetration bellows are not part of the containment pressure boundary. Therefore, provide the following information:

(i) Explain why cracking of the stainless steel penetration bellows (and the associated dissimilar metal welds) does not affect the bellows’ intended function.
(ii) Identify what aging effects are applicable to the penetration bellows (and the associated dissimilar metal welds), and the aging management programs that are credited to manage aging.

RAI 3.5-19
The staff notes that some entries in the "GALL Item Number" column of Report TR00170-003, Rev. 0, Attachment II appear to be incomplete, are unclear, or have duplicate entries. Examples are:

- Page 37, anchorage/embedments : for loss of material managed by the Boric Acid Corrosion Surveillances program, the "GALL Item Number" column identifies IIIB1.1.1-b and IIIB1.2.1-b. In accordance with NUREG-1801, Vol. 2, GALL Item Numbers IIIB2.1-b, IIIB3.1-b, IIIB4.1-b, and IIIB5.1-b should also be identified.
- Page 39, expansion anchors: for loss of material managed by the Boric Acid Corrosion Surveillances program, the "GALL Item Number" column identifies IIIB1.1.1-b. In accordance with NUREG-1801, Vol. 2, GALL Item Numbers IIIB1.2.1-b, IIIB2.1-b, IIIB3.1-b, IIIB4.1-b, and IIIB5.1-b should also be identified.

The applicant is requested to review and revise Report TR00170-003, Rev. 0, Attachment II, in order to ensure that the correct and appropriate GALL Item numbers are identified in the "GALL Item Number" column.

RAI 3.5-20
For the personnel airlock, escape airlock, and equipment hatch, the staff considers that loss of leak tightness in a closed position due to mechanical wear of locks, hinges, and closure mechanisms is an applicable aging effect that needs to be managed. This is NUREG-1801, Vol. 2, GALL Item Number II.A3.2-b. From the information provided on page 43 of Report TR00170-003, Rev. 0, Attachment II, it is not clear whether this aging effect will be managed for license renewal. LRA Table 3.5-1, AMR item 5 indicates an apparent commitment to manage this aging effect. However, the following statement is included in the "Discussion" column: "Operation of hatches is governed by VCSNS Technical Specifications. Plant operational experience has not identified any fretting or seal degradation. Locks, hinges, and closure mechanisms are active components; therefore, mechanical wear is not considered an aging effect." The applicant is requested to clarify its aging management review for this aging effect as follows:

(i) Verify that loss of leak tightness in a closed position due to mechanical wear of locks, hinges, and closure mechanisms for the personnel airlock, escape airlock, and equipment hatch is an applicable aging effect requiring management.
(ii) Technical Specifications 3/4.6.1 are referenced as an aging management program in Report TR00170-003, Rev. 0, Attachment II for the personnel airlock, escape airlock, and equipment hatch. Indicate whether the application of this specification allows any deviations from the requirements specified in the GALL XI.S1, ASME Section XI, Subsection IWE. If so, describe the deviations and provide the technical basis for concluding that the aging management commitment is at least equal to the ASME Section XI, Subsection IWE aging management program.

3.5 AGING MANAGEMENT PROGRAMS

RAI 3.5-21
The Introduction to Appendix B - Aging Management Programs and Activities of the LRA states that "clarification is provided for instances where the VCSNS program does not match specific

details of a NUREG-1801 program element but is still determined to be consistent." For the following aging management programs, a clarification is provided; however, it is not clear how the VCSNS program does not match the referenced GALL aging management program. Please explain what is intended by the clarification provided for each program and confirm that each program is completely consistent with GALL:

1. ASME Section XI ISI Program - IWF (B.1.13)

2. Containment ISI Program - IWE/IWL (B.1.16)

RAI 3.5-22
The staff noted several inconsistencies between the FSAR Supplement summary descriptions of the aging management programs in LRA Appendix A and the scope of the aging management programs identified in LRA Appendix B as "consistent with GALL." Some examples of these inconsistencies are:

(a) Section 18.2.5 of LRA Appendix A states that the ASME Section XI ISI Program – IWF manages "loss of material," while the parameters monitored under GALL XI.S3 are much broader and include: corrosion; deformation; misalignment; improper clearances; improper spring settings; damage to close tolerance machined or sliding surfaces; and missing, detached, or loosened support items.

(b) Section 18.2.5 of LRA Appendix A states that the ASME Section XI ISI Program – IWF manages cracking of high strength anchorage of ASME Class 1 component supports. Under GALL XI.S3 the visual inspection would be expected to identify relatively large cracks. If cracking of high strength anchorage needs to be managed, the staff would expect that the applicant would credit a program consistent with GALL XI.M18, Bolting Integrity.

For the following aging management programs identified as consistent with GALL, please verify that the complete scope of the aging management program, as described in NUREG-1801, GALL Volume 2, is being credited for license renewal aging management. If this is not the case, please identify and document the justification for each exception:

1. 10 CFR 50 Appendix J Leak Rate Testing (B.1.12)

2. ASME Section XI ISI Program - IWF (B.1.13)

3. Containment ISI Program - IWE/IWL (B.1.16)

4. Maintenance Rule Structures Program (B.1.18)

5. Service Water Pond Inspection Program (B.1.21)

6. Tendon Surveillance Program (B.3.3)

Also, revise the aging management program descriptions in LRA Appendix A to accurately reflect the scope of each program that is being credited for license renewal aging management.

The descriptions should make direct reference to applicable 10 CFR sections, codes, standards, regulatory guides, and any other formal documents that define the commitment.

RAI 3.5-23
The applicant states that 10 CFR 50 Appendix J General Visual Inspection (B.1.11) is consistent with XI.S4, 10 CFR 50 Appendix J, as identified in NUREG-1801. However, the scope of GALL XI.S4 is for containment leak rate testing and not general visual inspection of containments. Inspection of containments is covered by GALL XI.S1 and XI.S2, which involve ASME Section XI, Subsections IWE and IWL, respectively. The applicant states in LRA Section B.1.16 that the Containment ISI Program - IWE/IWL is consistent with GALL XI.S1 and XI.S2. The 10 CFR 50 Appendix J General Visual Inspection (B.1.11) is included in the discussion column of LRA Table 3.5-1, but is not identified as a credited aging management program in Report TR00170-003, Rev 0, Attachment II: Aging Management Review for Structures and Structural Components.

The applicant is requested to clarify whether the 10 CFR 50 Appendix J General Visual Inspection (B.1.11) program is credited as an aging management program for license renewal and provide the following information:

(i) If it is credited, the applicant needs to verify that it supplements the Containment ISI Program - IWE/IWL for visual inspection of containment, and is not used as a substitute.
(ii) If any element of the containment visual inspection relies solely on the 10 CFR 50 Appendix J General Visual Inspection (B.1.11) program, then this aging management program needs to be evaluated against the 10 program elements of an aging management program, using the guidance in Branch Technical Position RLSB-1 in Appendix A of NUREG-1800.
(iii) Identify which component types listed in Report TR00170-003, Rev 0, Attachment II credit this aging management program.

RAI 3.5-24
In LRA Section B.1.12.1 on operating experience, the applicant discussed a non-conformance (NCN) that was documented for rust found on the reactor building liner plate adjacent to the moisture barrier and a degraded moisture barrier. The disposition was to clean-up the rust on the reactor building liner plate adjacent to the moisture barrier and to replace affected portions of the moisture barrier. It is stated that visual examination and ultrasonic tests demonstrated that the liner plate had not degraded. The evaluation concluded that the condition was normal surface life exposure and was not aging related.

It is unclear to the staff why the NCN discussed above was identified by the Appendix J Leak Rate Testing program (B.1.12) and not by the Appendix J General Visual Inspection program (B.1.11) and/or the Containment ISI Program - IWE/IWL (B.1.16). The staff requests the applicant to provide the following information:

(i) Confirm that this nonconformance was detected prior to the implementation of the aging management program under LRA Section B.1.16. If not, explain why this nonconformance was not detected under the B.1.16 aging management program.
(ii) Explain why this nonconformance was not detected under the B.1.11 aging management program.

(iii) Clarify the scope of and interaction between all three aging management programs.
(iv) Explain why “normal surface life exposure” is not aging related.
(v) The rust on the liner plate and the degraded moisture barrier could indicate the presence of or result in degradation in the inaccessible areas of the containment liner. Discuss how the acceptability of the inaccessible areas of the containment liner was evaluated as a result of this nonconformance.

RAI 3.5-25
In LRA Section B.1.13.1, the applicant acknowledges that improperly heat-treated anchor bolts are susceptible to stress corrosion cracking, based on industry operating experience, but states that ASTM A490 anchor bolt material used at VCSNS is properly heat-treated by conforming to ASTM Specification A490 through a Certified Material Test Report, in accordance with station specifications. Although not stated, the applicant implies that stress corrosion cracking of A490 anchor bolt material used at VCSNS is not an aging management concern. The staff requests the applicant to specifically describe site-specific operating experience related to stress corrosion cracking of high-strength bolting materials used in Class I piping and component supports, including a description of inspection/test methods employed to detect it, and the technical basis for the adequacy of the methods employed.

RAI 3.5-26
LRA Section B.1.14 states that “although not credited for license renewal, the battery racks are also inspected for physical damage.” The staff requests the applicant to explain what is meant by “physical damage” and how this is distinguished from structural damage or degradation.

RAI 3.5-27
The Flood Barrier Inspection Program described in LRA Section B.1.17 is included in the discussion column of LRA Table 3.5-2, but is not credited for license renewal in Report TR00170-003, Rev 0, Attachment II: Aging Management Review Results for Structures and Structural Components. The staff requests that the applicant provide the following information regarding this program:

(i) Clearly state the component types and associated structures that credit this program for license renewal.
(ii) Explain the added value of this program since LRA Section B.1.17 states that either the Fire Protection Program or the Maintenance Rule Structures Program manages all flood barrier components.
(iii) Clarify why the scope section of this program indicates that there are flood seals in the intermediate building. The staff notes that flood barriers are not identified as a component type for the intermediate building in Report TR00170-003, Rev 0, Attachment II.
(iv) The section on “monitoring and trending” states the frequency of inspection for flood barrier seals that are also fire barrier penetration seals. Provide the frequency of inspection for flood barrier seals that are not fire barrier penetration seals, as well as all the other components within the scope of this program, such as flood barriers (walls, curbs, equipment pedestals) and flood doors.

RAI 3.5-28
LRA Section B.1.18 states that the Maintenance Rule Structures Program is consistent with GALL XI.S6 with several listed enhancements that will be incorporated into the program prior to the period of extended operation. The staff requests that the applicant provide the following information regarding this program:

(i) Verify that the scope of this program includes visual inspection of concrete for aging effects of loss of material, cracking and change in material properties and explain what this program requires for VCSNS concrete structures.
(ii) Since the North Berm, an earthen embankment, will be incorporated into the scope of this program, clarify that this program is also completely consistent with all the attributes of GALL XI.S7, RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants.
(iii) Since this program is credited for managing aging effects of masonry walls, clarify that this program is also completely consistent with all the attributes of GALL XI.S5, Masonry Wall Program.
(iv) Clarify the apparent editorial mistake in the last sentence of the second paragraph of LRA Section B.1.18.1 that states: "…including the protection and support of 0 systems and components."
(v) Clarify whether the commitment to incorporate the enhancements to this program discussed in LRA Section B.1.18 will also be included in the FSAR Supplement, Appendix A, Section 18.2.22. This section does not currently include such a commitment.

RAI 3.5-29
The Pressure Door Inspection Program described in LRA Section B.1.20 is included in the discussion column of LRA Table 3.5-2, but is not credited for license renewal in Report TR00170-003, Rev 0, Attachment II: Aging Management Review Results for Structures and Structural Components. The staff requests that the applicant provide the following information regarding this program:

(i) Clearly state the component types and associated structures that credit this program for license renewal.
(ii) Under "parameters monitored or inspected" it is stated that "Excessive wear for door appurtenances such as latches, gaskets, hinges, sills, and closing devices are additional attributes in the technical requirements package, but are not credited for license renewal." However, LRA Appendix A, Section 18.2.24 states that "Pressure door inspection attributes include freedom of movement, function (closed during normal plant operation), structural deterioration, and loss of door/door hardware material." These inconsistencies should be clarified.
(iii) Under "monitoring and trending," provide the frequency of inspection for all pressure doors within the scope of this program.

RAI 3.5-30
LRA Section B.1.21 states that the Service Water Pond Dam Inspection Program is consistent with GALL XI.S7 with several listed enhancements that will be incorporated into the program prior to the period of extended operation. The staff requests that the applicant provide the following information regarding this program:

(i) Clarify whether the commitment to incorporate the enhancements to this program discussed in LRA Section B.1.21 will also be included in the FSAR Supplement, Appendix A, Section 18.2.31. This section does not currently include such a commitment.
(ii) The discussion in LRA Section B.1.21.1 on operating experience does not include the East Dam. Please provide a discussion on the operating experience for the East Dam.

RAI 3.5-31
LRA Section B.1.23 Underwater Inspection Program (SWIS and SWPH), states that the scope of the program includes underwater inspections of both the service water intake structure (SWIS) and the service water pump house (SWPH). Report TR00170-003, Rev 0, Attachment II, states that the Underwater Inspection Program is credited for managing the aging effects for both SWIS and SWPH components for (1) loss of material and cracking in a raw water environment for concrete materials, and (2) loss of material in a raw water environment for steel materials. The concrete components identified in Attachment II include intake bays or canals and reinforced concrete - beams, columns, floor slabs, walls. The steel components identified in Attachment II include intake screens. The staff notes that the discussion column of LRA Table 3.5-2 states that VCSNS uses the Service Water Pond Dam Inspection Program (which is stated to be consistent with GALL XI.S7) inspections only for supplementary review for both the SWIS and SWPH. In order to complete the evaluation of this program, the staff requests that the applicant provides the following information:

(i) It is the staff's position that an effective aging management program for water control structures should incorporate the attributes described in GALL XI.S7. Since the applicant uses the Service Water Pond Inspection Program for supplementary review, the staff requests that the applicant explain which attributes from this program are not used for the inspections performed under the Underwater Inspection Program and provide a technical bases for their omission.
(ii) Several aging management program attributes discussed in LRA Section B.1.23 focus mainly on the SWIS. The applicant is requested to discuss the following AMP attributes as they apply to the SWPH components identified in Report TR00170-003, Rev 0, Attachment II:

    (a) parameters monitored or inspected
    (b) monitoring and trending
    (c) acceptance criteria
    (d) operating experience

(iii) With regard to the section on "Detection of Aging Effects," explain what is meant by the expression "attributes associated with aging" for both the SWIS and SWPH.
(iv) It is the staff's understanding that the complete scope of the Underwater Inspection Program is performed every five years for the SWIS. Please confirm that the staff's understanding is correct and that the inspection frequency also applies to the SWPH.
(v) The description of the Underwater Inspection Program for the FSAR Supplement in LRA Appendix A, Section 18.2.38 implies that underwater inspections of the SWPH only

serve to monitor corrosion and fouling within the Service Water System. If this is not correct, describe how the FSAR Supplement will be modified to reflect the complete scope of this program as it applies to the SWPH. If the scope of the program is limited as the statement implies, explain how the program can be credited for managing the SWPH aging effects discussed in the first paragraph of this request.

(vi) The conclusion provided in LRA Section B.1.23.2 states that "the Underwater Inspection Program (SWIS and SWPH) has been demonstrated to be capable of detecting and managing the effects of aging for concrete components in fluid environments." Please clarify why this conclusion omits reference to the aging effects for steel materials such as the intake screens.

RAI 3.5-32

In LRA Section B.3.3, the applicant states that a review of the non-conformances (NCNs) written to address programmatic and problematic deficiencies with the Tendon Surveillance Program indicates that there have been no adverse trends associated with aging that are not inherent to this type of post tensioning system.

The applicant states that a non-conformance (NCN) was identified to address the collection of water due to in-leakage into the auxiliary building tendon sump area to a depth that submerged a tendon end cap. The water level in the pit was reduced to a level below the tendon end cap. During RF-12 the tendon end cap was removed for inspection and no free water was found. Grease samples (analyzed for entrained moisture) and the tendon components (inspected for corrosion) were found to be acceptable. As a corrective action, Operations added the auxiliary building tendon sump area to their trend logs and will request facilities to drain the area if the water level in the area approaches the level of the tendon end cover.

The staff has concerns about the long-term condition of the tendon anchorages if subjected to additional episodes of water infiltration. Such environments could potentially degrade the tendon anchorage system, including anchor components inside the end cap, the baseplate and reinforced concrete region around the anchors. The staff requests the applicant to:

(i) Explain the relationship between the auxiliary building tendon sump area and the tendon access gallery beneath the containment.

(ii) Identify the type of tendon end caps (horizontal, vertical) in the auxiliary building tendon sump area.

(iii) Identify whether the tendon access gallery is also included in the Operations "trend logs" to prevent excessive water level, and if not, explain why not.

(iv) Discuss whether this commitment is credited for management of aging of the tendon prestressing system.

(v) Discuss why water is allowed to remain in the auxiliary building tendon sump area and only drained if the water level in the area approaches the level of the tendon end cover.

4.5 CONCRETE CONTAINMENT (REACTOR BUILDING) TENDON PRESTRESS TLAA

RAI 4.5-1

Section 4.5 of the LRA indicates that the reactor building tendons are a TLAA, and VCSNS will utilize 10 CFR 54.21(c)(1) - Option (iii) to demonstrate that the effects of aging on the intended

function(s) will be adequately managed for the period of extended operation. Appendix B.3.3 of the LRA indicates that the Tendon Surveillance Program is consistent with X.S1, Concrete Containment Tendon Prestress, as identified in NUREG-1801. In order for the staff to determine the adequacy of the tendon prestressing force and the TLAA for the period of extended operation, an understanding of the past operating experience for the tendons is needed.

Test results from the first three surveillances indicated that the wire relaxation force losses in the tendon system were greater than that which were predicted during design (resulting in lower measured prestressing forces). Therefore, in June 1988, the predicted wire relaxation force losses were increased from 8.5% to 12.5%. Then in the fourth period (10^{th} year) tendon surveillance, the vertical tendons were retensioned because the previous surveillance data indicated that the vertical tendon forces would be below the Technical Specifications minimum prior to the fifth period surveillance. Although the fifth period (15^{th} year) and sixth period (20^{th} year) tendon surveillances have been completed, no information was provided regarding the comparison of the measured tendon forces to the predicted lower limit at the 15^{th} and 20^{th} year tendon surveillances. LRA Section 4.5 indicates that based on trending data and results from previous surveillances, "VCSNS does not currently expect the tendons to provide adequate prestress for 60 years without future retensioning of various members."

In order to make a reasonable assessment regarding the effectiveness of the TLAA, the staff requests that the applicant provide the following information:

(i) Based on the past operating experience, provide the comparison of the measured lift-off forces against the predicted lower limits and minimum required values for each group of tendons, and project the data through the period of extended operation. These curves should reflect the past retensioning of the tendons. Provide the trend lines based on the VCSNS Tendon Surveillance Program for each group of tendons, showing measured prestressing forces above and below the trend lines. Identify whether the guidance in Information Notice 99-10 is implemented.

(ii) Provide a brief description of the reason why the tendon wire relaxation values were greater than those used in the design of the tendon system.