SeabrookNPEm Resource

From: Plasse, Richard
Sent: Wednesday, November 03, 2010 2:04 PM
To: Cliche, Richard
Subject: FW: Seabrook RAIs
Attachments: Seabrook SMP RAIs 10-25-10.docx; IWF RAI to Raj-11-02-2010.docx; IWL_RAIs_ORNL_R1 to Raj 11-02-2010.docx; Seabrook B.2.1.35 MEB XI.E4 RAI - 10-25-10 - DNguyen.doc; Seabrook Fuse Holder B.2.1.36. RAI 10-25-10 - DNguyen.doc; Seabrook IWE RAIs to Raj -10-28-2010.docx; Seabrook RAI B.2.1.34-1 Inaccessible Cables - CDoutt- 10-19-2010.doc

Draft AMP structural/electrical RAIs

Hearing Identifier: Seabrook_License_Renewal_NonPublic
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Mail Envelope Properties (Richard.Plasse@nrc.gov20101103140400)

Subject: FW: Seabrook RAIs
Sent Date: 11/3/2010 2:04:27 PM
Received Date: 11/3/2010 2:04:00 PM
From: Plasse, Richard

Created By: Richard.Plasse@nrc.gov

Recipients:
"Cliche, Richard" <Richard.Cliche@fpl.com>
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Files	**Size**	**Date & Time**
MESSAGE	38	11/3/2010 2:04:00 PM
Seabrook SMP RAIs 10-25-10.docx	51936	
IWF RAI to Raj-11-02-2010.docx	15594	
IWL_RAIs_ORNL_R1 to Raj 11-02-2010.docx	33428	
Seabrook B.2.1.35 MEB XI.E4 RAI - 10-25-10 - DNguyen.doc	26622	
Seabrook Fuse Holder B.2.1.36. RAI 10-25-10 - DNguyen.doc	27134	
Seabrook IWE RAIs to Raj -10-28-2010.docx	21445	
Seabrook RAI B.2.1.34-1 Inaccessible Cables - CDoutt- 10-19-2010.doc		27134

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Reply Requested: No
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RAI B.2.1.31-1

Background:

In the LRA and multiple condition reports, the applicant stated that below-grade concrete structures have experienced groundwater infiltration. During walkdowns, the staff observed indications of leaching and alkali-aggregate reactions in below-grade concrete structures.

Issue:

To understand the possible effects of the groundwater infiltration on concrete structures, testing of affected concrete was scheduled for 2010. The LRA did not include the results of this concrete testing.

Request:

a) Provide a summary of the results of the concrete testing performed to date. Results should include information on mechanical properties (e.g. compressive strength, modulus of elasticity, tensile strength, etc.). Explain how the properties of the cores can be correlated to the properties of the in-place concrete, and how this will be factored into the evaluation.
b) Explain if/why the samples are representative of affected concrete throughout the plant, including foundations and the containment enclosure building.
c) Discuss the root cause of any degradation (e.g. Alkali-Aggregate Reaction, leaching, etc.), and explain how it will be addressed in preparation for the period of extended operation.
d) Explain how future degradation will either be prevented, or managed during the period of extended operation.
e) Explain how structural stability will be maintained during the period of extended operation if concrete mechanical properties have been reduced by groundwater infiltration.

RAI B.2.1.31-2

Background:

In the LRA and multiple condition reports, the applicant stated that below-grade concrete structures have experienced groundwater infiltration. During walkdowns, the staff also observed multiple locations of groundwater infiltration.

Issue:

The groundwater infiltration has caused accelerated degradation of plant structures, supports and components as noted in multiple condition reports.

Request:

Explain how plant structures and components (i.e. supports, baseplate, cable trays, etc.)

throughout the plant will be managed for accelerated, or additional, aging effects due to exposure to groundwater infiltration, during the period of extended operation.

RAI B.2.1.31-3

Background:

During the audit, the staff learned that below-grade concrete structures have experience groundwater infiltration which has led to concrete degradation.

Issue:

The staff was unable to locate any inspection reports which identified and tracked the degradation in a quantitative manner. A baseline quantitative concrete inspection of in-scope structures is necessary for monitoring and trending degradation during the period of extended operation.

Request:

Provide plans for conducting a quantitative baseline inspection, in accordance with ACI 349.3R, prior to the period of extended operation.

RAI B.2.1.31-4

Background:

A review of plant-specific operating experience indicated that the spent fuel pool and transfer canal have shown indications of borated water leakage.

Issue:

Leakage from the spent fuel pool may migrate through the concrete walls and cause degradation of the concrete and reinforcing steel.

Request:

Clearly explain the operating experience related to the spent fuel pool leakage. Include the following in the response:

a) Historical data on the leakage occurrence and volume, including information on the assumed leakage path and structures that could potentially be affected by the presence of borated water. Provide the justification for assuming this leakage path.
b) Whether or not the leakage has stopped and justification for this conclusion. If the leakage has not stopped, discuss plans for remedial actions or repairs to address leakage through the spent fuel pool liner. In the absence of a commitment to fix the leakage prior to the period of extended operation, explain how the structures monitoring program, or other plant-specific program, will address the leakage to ensure that aging effects, especially in inaccessible areas, will be effectively

managed during the period of extended operation.

c) Provide background information and data to demonstrate that the concrete and embedded steel reinforcement have not been degraded by exposure to the borated water and will continue to perform their intended function during the period of extended operation.

Background:

10 CFR 50.55a imposes the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, for Class 1, 2, 3, and MC piping and components and their associated supports. The LRA states that the Seabrook AMP B.2.1.2, "ASME Section XI, Subsection IWF" is consistent with the GALL Report AMP XI.S3, "ASME Section XI, Subsection IWF". The GALL Report AMP XI.S3 states that the IWF scope of inspection for supports is based on sampling of the total support population. Discovery of support deficiencies during regularly scheduled inspections triggers an increase of the inspection scope, in order to ensure that the full extent of deficiencies is identified. IWF-2430 provides guidance on how to increase the sample size in case deficiencies are identified during examination of the supports.

Issue:

During the audit, the NRC staff reviewed documentation related to Seabrook Station operating experience and found that ISI inspections conducted during 1997 and 1999 identified 36 and 5 support conditions with deficient conditions respectively. During its review, the NRC staff did not find any documentation which indicated that support sample size was increased in accordance with IWF-2430. In addition, the staff review of the implementing procedures for IWF inspection did not find any guidance for increasing the sample size in accordance with IWF-2430.

Request:

Please provide documentation that demonstrates the IWF support inspections are performed in accordance with the recommendations of the GALL Report AMP XI.S3 regarding increase in the sample size in case deficiencies are identified during examination of supports.

RAI B.2.1.28-1

Background:

GALL Report (NUREG-1801), AMP XI.S2, "ASME Section XI, Subsection IWL" Element 6 states that ASME Section XI, Subsection IWL, Article IWL-3000 provides acceptance criteria for concrete containments. The GALL Report further states that quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R may also be used to augment the qualitative assessment of the responsible engineer.

In addition, Information Notice 2010-14, "Containment Concrete Surface Condition Examination Frequency and Acceptance Criteria" describes recent issues identified by the NRC staff during license renewal application review audits at different nuclear power plant sites concerning the containment concrete surface condition examination frequency and acceptance criteria. ~~During recent LRA audits, the NRC staff found that some nuclear plant licensees did not meet the requirements for containment concrete surface examinations specified in 10 CFR 50.55a, "Codes and Standards," dated August 8, 1996, and in Article IWL-2510, "Surface Examination," of Subsection IWL, "Requirements for Class CC Concrete Components of Light Water Cooled Power Plants," of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The NRC staff also found that the containment concrete surface degradation quantitative acceptance criteria used by the licensees for the ASME Section XI, Subsection IWL, aging management program were significantly less stringent than the acceptance criteria specified in American Concrete Institute (ACI) 201.1, "Guide for Making a Condition Survey of Concrete in Service," and ACI 349.3R, "Evaluation of Existing Nuclear Safety-Related Concrete Structures."~~

Issue:

The following statement is provided in LRA Section B2.1.28.

> Acceptance criteria in accordance with IWL-3000 for concrete containment are provided in Seabrook Station procedures. For concrete surfaces, the acceptance criteria rely on the determination of the "*Responsible Engineer*" regarding whether there is any evidence of damage or degradation sufficient to warrant further evaluation or repair in accordance with IWL-3300. The acceptance criteria are qualitative. Seabrook Station procedures also require that the Responsible Engineer be a registered professional engineer experienced in evaluating the inservice condition of structural concrete and knowledgeable of the design and construction codes and other criteria used in design and construction of concrete containments.

In addition, during the audit, the staff reviewed the applicant's implementing procedure for ASME Section XI, Subsection IWL program. The staff found that the AMP implementing procedure did not have any quantitative acceptance criteria for concrete surface examination similar to one described in ACI 349.3R-02. ~~In document LRAP-S002, Revision 1, Section 3.6, the applicant states that acceptance criteria for its ASME Section XI, Subsection IWL program for the concrete containment are provided in Procedure ES1807.031, Rev. 00, Chg. 01. Based on a review of this procedure, it appers that the procedure does not reference the three-tier "Evaluation Criteria" provided in ACI 349.3R-02, Chapter 5 or include methods for augmenting the qualitative assessment of the responsible engineer with acceptance criteria in~~

~~ACI 349.3R-02, Chapter 5. In addition, the examination criteria provided in Figures 2 and 3 of Procedure ES1807.031, Rev. 00, Chg. 01 are not consistent with acceptance criteria in ACI 349.3R-02, Chapter 5.~~

Request:

1. Provide information on how the degradation of concrete containment is quantified, tracked, and trended for use as a baseline for the period of extended operation.
2. Provide a description of actions taken to address issues identified in NRC Information Notice 2010-14, "Containment Concrete Surface Condition Examination Frequency and Acceptance Criteria."

~~The applicant is requested to provide the following information.~~

~~1. The basis for the examination criteria in Figures 2 and 3 of Procedure ES1807.031, Rev. 00, Chg. 01.~~

~~A description of actions taken to address issues identified in NRC Information Notice 2010-14, "Containment Concrete Surface Condition Examination Frequency and Acceptance Criteria."~~

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The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3).

RAI B.2.1.28~~XI.S2~~-2

Background:

GALL Report (NUREG-1801), AMP XI.S2, "ASME Section XI, Subsection IWL" Element 6 states that ASME Section XI, Subsection IWL, Article IWL-3000 provides acceptance criteria for concrete containments and that quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R may also be used to augment the qualitative assessment of the responsible engineer. LRA Section B2.1.28 states that preventive maintenance work orders are used for tracking and identifying conditions identified during surveillances. Issues and events, whether external or plant specific, that are potentially significant to containment reinforced concrete at Seabrook Station, or which show deficiencies in excess of acceptance criteria are evaluated.

Issue:

During the audit, the staff reviewed results of visual examination of concrete containment surface (VT-3C examination) performed in October, ~~Work Order 0526254 dated October 12,~~ 2005, provides VT-3C visual inspection results for the concrete containment. These results identified numerous areas of spalled concrete that equal or exceeded a depth of 1 in. According to evaluation criteria in ACI 349.3R-02, Sect. 5.1, spalled areas that exceed a depth of 3/8 in. and 4 in. in any dimension must be evaluated.

Request:

The applicant is requested to provide the following information.

1. A description of the methods used to evaluate spalled areas that exceed a depth of 3/8 in. and 4 in. in any dimension in accordance with "Acceptance After Review" criteria in ACI 349.3R-02, Sect. 5.2, the acceptance criteria for spall size and depth, and results of the engineering evaluation.
2. A description of the methods used to evaluate spalled areas that exceed a depth of 3/4 in. and 8 in. in any dimension in accordance with "Conditions Requiring Further Evaluation" criteria in ACI 349.3R-02, Sect. 5.3, the acceptance criteria for spall size and depth that do not require repair, and results of the engineering evaluation.
3. The findings from the most recent Engineering Evaluation Report that was prepared to comply with ASME Section XI, Subsection IWL-3310 requirements.

The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3).

RAI B.2.1.28~~XI.S2~~-3

Background:

LRA Section 3.5.2.2.1.1 states that degradation of concrete due to aggressive chemical attack is applicable to the Seabrook Station and that groundwater analyses confirm that the Seabrook Station site groundwater is aggressive. Testing performed from November 2008 to September 2009 found pH values between 5.8 and 7.5, chloride values between 19 ppm and 3900 ppm, and sulfate values between 10 ppm and 100 ppm. The applicant further stated that corrosion of embedded steel becomes significant if environmental conditions are found to be aggressive. According to the applicant, concrete cracking due to expansion and reaction with aggregates is managed through the ASME Section XI, Subsection IWL Program, B.2.1.28 and the Structures Monitoring Program, B.2.1.31.

Issue:

Concrete containment surfaces that are exposed to groundwater are susceptible to cracking due to expansion and reaction with aggregates because the Seabrook Station site groundwater is aggressive. In addition, steel reinforcing bars embedded in concrete that is exposed to groundwater are susceptible to chloride-induced corrosion. Degradation of reinforced concrete on the outside of the containment in the annulus between the containment and the enclosure building from elevation -30 ft to +20 ft is possible if groundwater accumulates in this space. During the audit, the staff learned that the applicant observed water accumulation in the annulus between the containment and the enclosure building but the containment concrete does not exhibit evidence of cracking due to expansion and reaction with aggregates.

Request:

The applicant is requested to provide the following information.

1. The test method or procedure used to confirm that the exterior containment concrete surface between elevation -30 ft and +20 ft is not experiencing cracking due to expansion and reaction with aggregates.
2. The test method or procedure used to verify that the compressive strength and modulus of elasticity of the containment concrete between elevation -30 ft and +20 ft are not affected by cracking due to expansion and reaction with aggregates.
3. Results of any existing or planned compressive, tensile, and modulus elasticity of concrete core samples taken from the concrete containment between elevation -30 ft and +20 ft.

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The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3).

RAI XI.S2-4

Background:

During the audit, the staff learned that the concrete containment is susceptible to cracking due to expansion and reaction with aggregates because the groundwater is aggressive. According to the applicant, concrete cracking due to expansion and reaction with aggregates is managed through the ASME Section XI, Subsection IWL Program, B.2.1.28 and the Structures Monitoring Program, B.2.1.31.

Issue:

A review of Seabrook Station condition reports by the staff did not identify inspection findings that discussed cracking of concrete due to expansion and reaction with aggregates or nondestructive or destructive test data that quantify the magnitude or extent of cracking of accessible above-grade and below-grade portions of the concrete containment. In order to monitor and trend changes in the condition of the concrete, a baseline condition assessment needs to be performed and documented to serve as a reference for future containment concrete inspections and evaluations.

Request:

The applicant is requested to provide the following information.

1. The plans and schedule for conducting a baseline inspection of the condition of accessible above-grade and below-grade portions of the concrete containment in accordance with ACI 349.3R requirements.
2. The plans and schedule for obtaining nondestructive or destructive test data for quantifying the mechanical properties (compressive strength, tensile strength, and modulus of elasticity) of concrete in areas that have experienced cracking due to expansion and reaction with aggregates.

The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3).

Request for Additional Information
Metal Enclosed Bus Program
B.2.1.35

B.2.1.35-1

Background: In Seabrook basis document LRAP-E4 the applicant states that the MEB program will perform thermography inspections external to the MEB's to determine if the in-scope MEB's have loose connections due to thermal cycling and ohmic heating. The inspections will be performed on all accessible bus sections while the bus is energized. Normally, windows are installed on the MEB for thermography inspections.

Issue: The metal enclosed cover may mask the heat created by loosening of bus connections and the temperature differences between bus connections which may not be detected if windows are not installed on MEBs.

Request: Discuss how the MEB connection inspections at Seabrook are effective in detecting loosening of bus connections using external thermography measurements.

Request for Additional Information
Fuse Holder
B.2.1.36

B.2.1.36-1

Background: GALL Report AMP XI.E5 under "parameters monitored or inspected" element states that the monitoring includes thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling or electrical transients, mechanical fatigue caused by frequent removal/replacement of the fuse or vibration, chemical contamination, corrosion, and oxidation. In the Seabrook aging management program basis document LRAP-E5 under the same element, the applicant states that the Seabrook Station program only includes monitoring for the presence of corrosion and oxidation.

Issue: Although the applicant concluded that the aging effects/mechanisms due to thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling or electrical transients, mechanical fatigue caused by frequent removal/replacement of the fuse or vibration identified by GALL are not applicable to the fuse holders at the Seabrook, the applicant's LRA or the supporting basis document did not include any justification to substantiate their conclusion.

Request: Discuss how the Seabrook aging management program element 3 is consistent with program element in the GALL report. In addition, explain why the aging effects/ mechanisms due to thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling or electrical transients, and mechanical fatigue caused by frequent removal/replacement of the fuse or vibration, identified in GALL report are not applicable to fuse holders at the Seabrook Station.

RAI B.2.1.27-1

Background

GALL Report AMP XI.S1, "ASME Section XI, Subsection IWE," recommend that the applicant is to consider the liner plate and containment shell corrosion concerns described in generic communications. In June 2010, NRC issued Information Notice IN 2010-12 to inform the holders of an operating license or construction permit for a nuclear power reactor about recent issues involving through wall corrosion of the steel reactor containment building liner. The recipients of this IN 2010-12 are expected to review the information for applicability to their facilities and to consider actions, as appropriate, to avoid similar problems.

Issue

During the AMP audit at Seabrook Station, the staff interviewed the applicant staff and reviewed documentation about the ground water seepage in different plant structures. The staff found that ground water infiltrated into the annular space between the concrete enclosure building and concrete containment. The bottom 6 feet of the concrete containment wall was in contact with the ground water for a long period of time. In addition, cracks due to Alkali-Silica Reaction (ASR) have been observed in different Seabrook plant concrete structures, including the concrete enclosure building. Therefore, the ground water may have penetrated the concrete containment wall and come into contact with the containment liner plate. This can result in through wall corrosion of the containment liner plate.

Request:

Please provide the details of any plans to perform non destructive examinations, such as ultrasonic testing (UT), of the containment liner to demonstrate that the effects of prolonged exposure of bottom portion of the concrete containment to ground water have not introduced corrosion on the concrete side of the liner plate. Corrosion on the concrete side of the containment liner can affect its ability to perform its intended design function during the period of extended operation.

RAI B.2.1.27-2

Background:

GALL Report AMP XI.S1, "ASME Section XI, Subsection IWE," states that 10 CFR 50.55a imposes the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Subsection IWE for steel containments (Class MC) and steel liners for concrete containments (Class CC). The full scope of IWE includes steel containment shells and their integral attachments; steel liners for concrete containments and their integral attachments; containment hatches and airlocks; seals, gaskets and moisture barriers; and pressure-retaining bolting. This evaluation covers the 2001 edition including the 2002 and 2003 Addenda, as approved in 10 CFR 50.55a. ASME Code Section XI, Subsection IWE and the additional requirements specified in 10 CFR 50.55a(b)(2) constitute an existing mandated program applicable to managing aging of steel containments, steel liners of concrete containments, and other containment components for license renewal.

Seabrook Station requested and received approval from NRC on August 30, 2000 to implement the 1995 Edition with 1996 Addenda for ASME Section XI for second inspection interval between 2000 and 2010.

Article IWE-3122.3 of the 1995 Edition with 1996 Addenda for ASME Section XI states, "when flaws or areas of degradation are accepted by engineering evaluation, the area containing the flaw or degradation shall be reexamined in accordance with IWE-2420(b) and (c)." IWE -2420 require that the flaws or areas of degradation or areas of degradation remain essentially unchanged for three consecutive inspection periods, these areas no longer require augmented examination in accordance with Table IWE-2500-1, Examination Category E-C

Issue:

During the site audit, the NRC staff reviewed documentation concerning the corrosion of containment liner plate around the fuel transfer tube vault documented during the 2009 IWE inspection. The containment liner plate had indications of heavy corrosion. UT examination of containment liner indicated that liner plate thickness varied between 0.484 to 0.411 inches (variation of 18 percent) within a small area.

The applicant accepted this degradation of the liner plate based on engineering evaluation. The applicant justification for acceptance was that the measured thickness of the liner plate was still greater than the 0.375 inch nominal thickness of the liner plate. However, the NRC staff did not find any requirement in the applicant's engineering evaluation that requires UT reexamination of the affected portion of the liner plate for three consecutive periods in accordance with IWE-2420.

Request:

Provide the details of any actions planned for augmented examination of the containment liner plate around the fuel transfer tube where the corrosion was detected during the 2009 inspection. The staff needs this information to verify that the effects of aging on the intended function of the containment liner plate will be adequately managed for the period of extended operation.

Seabrook B.2.1- RAI B.2.1.34-1 Inaccessible Cables - Cliff Doutt

Background:

GALL Report AMP XI.E3, “Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements” Program Element 1, “Scope of Program,” provides definitions for significant moisture. SPR LR Table 3.6-2, FSAR Supplement for Aging Management of Electrical and Instrumentation and Control System also includes definitions for significant moisture.

Issue:

LRA UFSAR Supplement Section A.2.1.34 does not include definitions of significant moisture consistent with SRP LR Table 3.6-2 or GALL AMP XI.E3, “Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.” The lack of this definition in combination with the applicant’s stated objective of using inspections to ensure that cables are not subject to significant moisture may not provide consistency with GALL AMP XI.E3.

Request:

Explain why LRA UFSAR supplement A.2.1.34 for LRA AMP B.2.1.34 does not include the definition of significant moisture consistent with GALL Report AMP XI.E3 and SRP LR Table 3.6-2.