LimerickNPEm Resource

From: Kuntz, Robert
Sent: Tuesday, May 01, 2012 2:18 PM
To: Anthony Z. Roisman; gfettus@nrdc.org
Cc: Smith, Maxwell; Kanatas, Catherine
Subject: FW: DRAFT Request for Information
Attachments: DRAFT suppression pool liner and refueling bellows RAIs.docx

---

From: Kuntz, Robert
Sent: Monday, April 02, 2012 2:05 PM
To: 'Christopher.Wilson2@exeloncorp.com'
Subject: DRAFT Request for Information

Chris,

Attached is a DRAFT Request for Information related to the Limerick license renewal application. If Exelon would like clarification on the attached let me know and I can schedule a teleconference with the NRC Staff.

Robert Kuntz
Sr. Project Manager
NRR/ADRO/DLR/RPB1
(301) 415-3733
robert.kuntz@nrc.gov

Hearing Identifier: Limerick_LR_NonPublic
Email Number: 228

Mail Envelope Properties (Robert.Kuntz@nrc.gov20120501141700)

Subject: FW: DRAFT Request for Information
Sent Date: 5/1/2012 2:17:42 PM
Received Date: 5/1/2012 2:17:00 PM
From: Kuntz, Robert

Created By: Robert.Kuntz@nrc.gov

Recipients:
"Smith, Maxwell" <Maxwell.Smith@nrc.gov>
Tracking Status: None
"Kanatas, Catherine" <Catherine.Kanatas@nrc.gov>
Tracking Status: None
"Anthony Z. Roisman" <aroisman@nationallegalscholars.com>
Tracking Status: None
"gfettus@nrdc.org" <gfettus@nrdc.org>
Tracking Status: None

Post Office:

Files	**Size**	**Date & Time**	
MESSAGE	504	5/1/2012 2:17:00 PM	
DRAFT suppression pool liner and refueling bellows RAIs.docx			34899

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

LIMERICK GENERATING STATION
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION

DRAI B.2.1.30-1.1

Background

The response to RAI B.2.1.30-1, dated February 28, 2012, stated that the American Society of Mechanical Engineers (ASME) Section XI, Subsection IWE (B.2.1.30) and the 10 CFR Part 50, Appendix J (B.2.1.33) programs are credited for managing the loss of material in the steel suppression pool liner; however, inspection of the suppression pool liner coating is performed to ensure that the coatings intended function to "maintain adhesion" is maintained and to ensure that the coating continues to function as a preventive measure to corrosion. These inspection activities, in addition to suppression pool desludging, more frequent ASME Code, Section XI, Subsection, IWE examinations, and the coating maintenance plan as described in LRA Appendix A, Table A.5, Commitment 30 ensure that sufficient thickness margin of the suppression pool liner will be maintained through the period of extended operation.

Issue

Recoating of the local areas of the suppression pool with general corrosion exhibiting greater than 25 mils plate thickness loss or spot recoating in local areas with pitting greater than 50 mils deep or recoating the liner plates with greater than 25 percent coating depletion prior to the period of extended operation in 2024 for Limerick Generating Station (LGS), Unit 1 and 2029 for LGS, Unit 2 will not ensure that the coating will continue to function as a preventive measure to corrosion. The suppression pool coating has degraded substantially and is beyond its service life since 1990s, as documented in AR # 01063631.

According to Commitment 30, the coating maintenance plan will be initiated in the 2012 refueling outage for LGS, Unit 1 and the 2013 refueling outage for LGS, Unit 2, and implemented such that the areas exceeding the above criteria are recoated prior to the period of extended operation that starts in 2024 for LGS, Unit 1 and 2029 for LGS, Unit 2. To delay recoating the degraded areas of the suppression pool experiencing more than 25 percent loss by 12 to 17 years (2024 and 2029) is not acceptable especially since four of the 44 floor panels and 2 of the 30 wall panels experienced a loss of greater than 30 percent of the protective coating documented in 2010. One floor panel had a loss of 72 percent of the underwater coating. Areas of the suppression pool liner plate with 25 percent coating depletion cannot continue to function as a preventive measure for corrosion during the period of extended operation.

Request

Protective coatings help in long term aging management of the suppression pool liner plate by preventing and inhibiting general and pitting corrosion. Therefore, provide additional information on how selectively recoating of the suppression pool carbon steel liner plate, in areas where existing coating has depleted more than 25 percent, will ensure that the coating will continue to function as a preventive measure to corrosion during the period of extended operation.

DRAI B.2.1.30-2.1

Background

The response to RAI B.2.1.30-2, dated February 28, 2012, stated:

1. The acceptance criterion used for the initial visual examination of the LGS, Unit 1 downcomers in the 1R13 outage, as reported in AR 1063631, is less than or equal to 60 mils. The technical basis of this owner-established criterion is the design analyses for the downcomers. These analyses conclude that surface defects of less than or equal to 0.0625 inches are acceptable to meet design requirements. The corrosion found on the downcomers during 1R13 outage affected less than 13 percent of the cumulative surface area examined. Loss of metal in the exposed substrate was generally less than 15 mils.

2. Small areas of minimal general corrosion identified on the 1.25-inch thick columns do not affect load bearing capacity or visibly reduce the cross sectional area, and are therefore acceptable.

3. The acceptance criterion used for inspections of the submerged portion of the suppression pool liner for general corrosion is less than or equal to 0.125 inch metal loss. In addition, spot corrosion less than or equal to 2.5 inches in diameter may be 0.1875 inches in depth. The specification and analysis contain acceptance criteria which consider variations in plate thickness due to corrosion in the submerged portion of the suppression pool liner plate. The acceptance criteria varies based on the size of corrosion sites and the surrounding wall thickness. For a plate which is 4 percent under the theoretical thickness, the lower plate stiffness could create a slight increase in loading on the anchor.

4. The Generic Aging Lessons Learned (GALL) Report does not recommend augmented examinations (Examination Category E-C) of areas with material loss in excess of 10 percent of the nominal containment wall thickness. ASME Code, Section XI, Subsection IWE, specifically IWE-1240, also does not recommend augmented examinations (Examination Category E-C) of areas with material loss in excess of 10 percent of the nominal containment wall thickness. To accept a component for continued service by examination in accordance with IWE-3122.1, the acceptance standards of IWE-3500 must be met. No mention is made in these paragraphs of a 10 percent wall loss criterion. For E-A examinations, the examinations must meet the standards of ASME Code, Section XI, Subsection IWE, specifically IWE-3510.1 and IWE-3510.2, which indicate that the Owner shall define the acceptance criteria.

Issue

1. The response to the RAI B.2.1.30-2 states that the owner-established criteria for recoating of downcomers is based on the analysis that surface defects of less than or equal to 0.0625 inches are acceptable to meet design requirements. However, it is not clear if the surface defects considered were for local pitting degradation or for general corrosion. In addition, the staff cannot find any reference to this analysis in the Updated Final Safety Analysis Report (UFSAR).
2. The staff finds the response to RAI B.2.1.30-2 concerning the current condition of the suppression pool support columns acceptable because general corrosion loss of 20 mils

is equivalent to less than 2 percent of the 1.25-inch thick columns, and will not affect the load carrying capacity of the columns. However, the staff is not clear how the aging and trending of corrosion of the support columns will be managed in the future since the support columns are ASME Code, Section XI, Subsection IWF Class MC components and are inspected on a 10 year interval. Commitment 30 requires an ASME Code, Section XI, Subsection IWE, examination of the submerged portion of the suppression pool each ISI period.

3. General corrosion in some of the liner plates in LGS, Units 1 and 2 suppression pools is up to 35 mils or 14 percent of the nominal thickness of the liner plate. The response stated that a plate which is 4 percent under the theoretical thickness, the lower plate stiffness would create a slight increase in loading on the anchor; however the response has not addressed the effect of this loss in thickness of 14 percent on the capacity liner anchors, including the welds between the liner plate and the anchor.

4. ASME Code, Section XI, Subsection IWE, IWE-1241, "Examination Surface Areas," states that surface areas likely to experience accelerated degradation and aging require the augmented examinations identified in Table IWE-2500-1, Examination Category E-C. Such areas include the interior and exterior containment surface areas that are subject to accelerated corrosion with no or minimal corrosion allowance or areas where the absence or repeated loss of protective coatings has resulted in substantial corrosion and pitting. Typical locations of such areas are those exposed to standing water. The carbon steel liner plate in the suppression pool has standing water and is subject to accelerated corrosion and pitting with substantial loss of protective coating. In addition the coating is beyond its designed life. Therefore, the liner plate surfaces in the suppression pool that is exposed to standing water require augmented inspection in accordance with ASME Code, Section XI, Subsection IWE, IWE-1241.

Request

1. Provide additional details about the assumption used for developing owner-established criteria for recoating of downcomers. Did the analysis consider surface defects of less than or equal to 0.0625 inches as due to local degradation or as a general corrosion allowance? In addition, provide reference to any design basis document in which the analysis is documented.

2. Clarify if the support columns in the suppression pool will be inspected every ISI period or every ISI interval.

3. Confirm that the effect of the loss in thickness of 35 mils (14 percent) in one liner plate located adjacent to another plate without any loss and up to 16 percent over nominal thickness on the capacity of liner anchors has been considered in the analysis.

4. Explain why suppression pool liner plates at LGS, Units 1 and 2 that are subject to accelerated corrosion and loss of protective coatings are not selected for augmented inspection as specified in ASME Code, Section XI, Subsection IWE, specifically IWE-1241.

DRAI B.2.1.30-4.1

Background

The response to RAI B.2.1.30-2, dated February 28, 2012, stated that the LGS ASME Section XI, Subsection IWE program as described in LRA Section B.2.1.30 is consistent with GALL Report AMP XI.S1 and ASME Section XI requirements for monitoring and trending. The corrosion of the submerged portion of the suppression pool liner is being trended and is between 1 to 2 mils per year based on data collected during several ASME Code, Section XI, Subsection IWE, inspections performed since 1996 in both LGS, Units 1 and 2. The response further stated that this rate compares well with the corrosion rate of 1.8 mils determined by an engineering analysis for uncoated carbon steel components in the suppression pool for the LGS specific suppression pool water chemistry and operating temperature. The response has also determined that the expected general corrosion rate, if applied to uncoated steel areas for 60 years, will result in a containment liner thickness that meets the liner engineering acceptance criteria for structural integrity.

Issue

The staff finds the response concerning the general corrosion rate of about 2 mils per year for carbon steel liner plate exposed to standing water in the suppression pool acceptable because it is based on actual measured data over several refueling outages since 1996. However, the pitting corrosion rate is unpredictable and usually 2-10 times more than general corrosion rate. This is evident at the LGS suppression pool liner plate where pitting corrosion of 122 mils has been observed in 2010, about 25 years after the plant started operation. This loss could not have started immediately after plant operation because it takes time for the protective coating to degrade.

Request

Explain how containment liner thickness will meet the engineering acceptance criteria for structural integrity, in areas of degraded coating, where pitting corrosion continues at the rate of 4 to 20 mils per year for 60 years or even until the period of extended operation starting in 2024 in LGS, Unit 1 and 2029 in LGS, Unit 2 as described in Commitment 30.

DRAI 3.5.2.11-2

Background

The stainless steel bellows are an integral part of the primary containment pressure boundary in nuclear power plants. The Refueling Bellows Assemblies provide accommodation for movements of the reactor vessel caused by operating temperature variations and seismic activities as well as prevent leakage from the reactor well during refueling operations. The NRC issued NUREG/CR-6726 “Aging Management and Performance of Stainless Steel Bellows in Nuclear Power Plants,” issued in May 2001, summarizing information on how to evaluate bellows for age-related degradations including aging mechanism results in loss of bellows functionality during the current operations or for the period of extended operations (PEO).

Additionally, NUREG/CR- 7111, "A Summary of Aging Effects and Their Management in Reactor Spent Fuel Pools, Refueling Cavities, Tori, and Safety-Related Concrete Structures," issued in January 2012, identifies the Refueling Bellows to be a possible source of leakage.

The LRA states that the Refueling Bellows Assemblies are evaluated within the license renewal Primary Containment Structure. Table 3.5.2-11 of the LRA identifies the stainless steel portion of the "Refueling Bellows Assembly" as subject to loss of material under a treated water environment, and references line item III.A5.T-14 from the GALL Report (NUREG-1801).

Issue

GALL Report line item III.A5.T-14, which is referenced in the LRA for the Refueling Bellows Assembly, lists aging effects of cracking due to stress corrosion cracking and loss of material due to pitting and crevice corrosion under treated water or treated borated water environments, for the fuel pool liner of the "Fuel Storage Facility, Refueling Canal." This item in the GALL Report identifies the water chemistry AMP and monitoring of the spent fuel pool level and leakage from leak chase channels as appropriate to manage this aging. The LRA identifies only the Water Chemistry program.

It is unclear to the staff whether LGS has experienced plant specific, and/or considered any industry operating experience(s) of leakage(s) from the Refueling Bellows Assemblies to identify the need to augment the plant specific program requirements for license renewal.

Requests

(a) Justify the exclusion of cracking due to stress corrosion cracking as an aging effect requiring management, since this is included in the GALL Report for a related item, as cited in the LRA.

(b) Provide all plant specific operating experience of leakage from the Refueling Bellows Assemblies, and provide applicability and resolution(s) of condition report(s) (CRs) that may have been generated from the industry operating experience to evaluate the site Refueling Bellows Assemblies.

(c) Describe how the structural and leak-tight integrities of the Refueling Bellows Assemblies are currently monitored and will be monitored during the PEO.