

DiabloCanyonNPem Resource

From: Ferrer, Nathaniel
Sent: Monday, August 16, 2010 3:02 PM
To: Grebel, Terence; Soenen, Philippe R
Cc: DiabloHearingFile Resource
Subject: Draft RAI Set 21 - AMR and TLAA
Attachments: Draft RAI Set 21 AMR and TLAA RAIs.doc

Terry and Philippe,

Attached is Draft RAI Set 21 containing draft RAIs, specifically on portions of the aging management and TLAA review. Please review the attached draft RAIs and let me know if and when you would like to have a teleconference call. The purpose of the call will be to obtain clarification on the staff's request.

Please let me know if you have any questions.

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Hearing Identifier: DiabloCanyon_LicenseRenewal_NonPublic
Email Number: 1931

Mail Envelope Properties (26E42474DB238C408C94990815A02F090A8287D14A)

Subject: Draft RAI Set 21 - AMR and TLAA
Sent Date: 8/16/2010 3:02:15 PM
Received Date: 8/16/2010 3:02:25 PM
From: Ferrer, Nathaniel

Created By: Nathaniel.Ferrer@nrc.gov

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Files	Size	Date & Time
MESSAGE	573	8/16/2010 3:02:25 PM
Draft RAI Set 21 AMR and TLAA RAIs.doc		64506

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

Diablo Canyon Nuclear Power Plant, Units 1 and 2 (DCPP)
License Renewal Application (LRA)
Draft Request for Additional Information Set 21
Aging Management Review/TLAA

D-RAI 3.1.2.3.2-2

In LRA Table 3.1.2-2, the applicant stated that for calcium silicate insulation exposed to borated water leakage (external) there is no aging effect and no AMP is proposed. The AMR line item cites generic note F. The GALL Report does not have any line items associated with calcium silicate insulation.

The staff notes that calcium silicate insulation is easily damaged by water and because of this is typically provided with protective jacketing. The staff also notes that based on a search of the LRA, there are no line items for insulation jacketing.

Request

1. Clarify whether the calcium silicate insulation is protected by jacketing. If it is, state how the seams in the jacketing are controlled to mitigate leakage.
2. State what program manages the aging effect of deterioration of the insulation by borated water leakage.

D-RAI 3.3.2.3.5-1

Background:

In LRA Tables 3.3.2-5 and 3.4.2.1, the applicant stated that carbon steel indicators, sight glasses, piping, pumps, tanks, and valves internally exposed to sodium hydroxide (NaOH) are being managed for loss of material by the Water Chemistry and One-Time Inspection Programs. The AMR line items cite generic note G and a plant specific note, which states "The use of carbon steel up to 200°F (93°C) and 50 wt percent NaOH is common in industrial applications with no special consideration for aging. The NaOH concentration is controlled by the Water Chemistry Program." The AMR line item cites generic note G. None of these carbon steel components exposed to NaOH are being managed for cracking due to stress corrosion cracking (SCC).

According to the 2006 edition of the ASM Handbook, Volume 13C, corrosion of carbon steels is expected when exposed to NaOH, but corrosion rates are generally acceptable for up to a 50% NaOH solution at temperatures up to approximately 150°F. The ASM Handbook also states that carbon steels under tensile stress can experience SCC. The ASM Handbook further states that SCC generally does not occur in carbon steels exposed to a 50% NaOH solution at temperatures below 150°F, but has occurred as low as 118°F.

GALL AMP XI.M2, "Water Chemistry" recommends that primary and secondary water chemistry be monitored and controlled in accordance with industry guidelines, such as EPRI TR-105714, *PWR Primary Water Chemistry Guidelines*, Rev. 3 and TR-102134, *PWR Secondary Water Chemistry Guideline*, Rev. 3 or later revisions. The applicant's Water Chemistry Program states that its primary water chemistry program is consistent with the guidelines of EPRI TR-105714, Revision 6; and its secondary water chemistry program is consistent with the guidelines of EPRI

TR-102134, Revision 7. EPRI primary and secondary water chemistry guidelines include guidance for limiting the concentration of sodium hydroxide in reactor water because it is a contaminant that can cause stress corrosion cracking, but do not include control parameters for concentrated NaOH used in auxiliary systems. GALL AMP XI.M2, "Water Chemistry" is a mitigation program that relies on the control of contaminants in primary and secondary water to prevent aging and does not include any activities to detect the effects of aging. GALL AMP XI.32, "One-Time Inspection" is an inspection program used to confirm the absence of an aging effect or confirm that the effect is occurring slowly enough such that it will not affect the intended function of the component during the period of extended operation.

Issue:

Neither the EPRI water chemistry guidelines nor the applicant's description of its Water Chemistry Program include the parameters that would be monitored and controlled in order to minimize corrosion and SCC due to exposure to sodium hydroxide. It is not clear to the staff what parameters are being monitored or the acceptance criteria that have been established in order to manage aging for these components exposed to NaOH.

It is not clear to the staff why SCC is not an applicable aging affect for these carbon steel components exposed to sodium hydroxide; given that SCC can occur in carbon steel at temperatures as low as 118°F. Additionally, threaded and flanged connections that experience leakage can allow the NaOH solution to concentrate, leading to SCC. It is not clear to the staff how these components are being adequately managed for aging by the One-Time Inspection Program given that SCC could be expected to occur in carbon steel components exposed to sodium hydroxide.

Request:

1. Describe the parameters (e.g., temperature, concentration) being monitored and acceptance criteria for the sodium hydroxide solution being monitored by the Water Chemistry Program.
2. Describe whether carbon steel components exposed to sodium hydroxide contain threaded or flanged connections or are exposed to temperatures greater than 118°F. If either of the above conditions exists, provide justification for why the carbon steel components exposed to sodium hydroxide do not need to be managed for SCC, or provide additional information on how SCC of the components will be managed during the period of extended operation.

D-RAI 3.3.2.3.11-1

GALL Report Section IX.F, Significant Aging Mechanisms, states that elastomer degradation may include cracking, crazing, fatigue breakdown, abrasion, chemical attacks, and weathering. GALL Report IX.E, Aging Effects, states that hardening and loss of strength can result from elastomer degradation of seals and other elastomeric components. LRA Section B2.1.20, External Surfaces Monitoring Program, states, "[w]hen appropriate for the component configuration and material, physical manipulation of elastomers is used to augment visual inspections to confirm the absence of hardening or loss of strength. In LRA Tables 3.3.2-11 and 3.3.2-17 two line items associated with flexible connectors and caulking and sealant cite generic note G and manage the aging effect of hardening and loss of strength by the External Surfaces Monitoring Program.

LRA Section B2.1.20, External Surfaces Monitoring Program does not state that elastomers will

be inspected for cracking, and changes in surface condition.

Confirm that the External Surfaces Monitoring Program inspects elastomers for cracking and changes in surface conditions or justify why the program is acceptable to manage the aging effects of hardening and loss of strength.

D-RAI 4.1-1

Background: In LRA Section 4.7.3, the applicant identifies that the generic fatigue flaw growth analysis for reactor vessel (RV) under-clad cracking in Westinghouse Topical Report No. WCAP-15338-A is not an analysis that meets the definition of a TLAA in 10 CFR 54.3.

Issue 1: In LRA Section 4.7.3, the applicant states that the analysis in WCAP-15338-A qualifies reactor pressure vessels for the 60-year operating period rather than the current licensed operating period (40 years), and based on this, the flaw growth analysis for underclad cracks in low-alloy steel RV forgings is not a TLAA under 10 CFR 54.3(a)(3) criterion. The staff noted that the 60-year basis for concluding that the generic analysis in WCAP-15338-A does not need to be identified as a TLAA appears contrary to the basis in the SOC on 10 CFR Part 54 that identifies that 60-year analyses should be identified as TLAAs.

Request 1: Clarify whether WCAP-15338-A is being credited in the CLB for analysis of under-clad flaws in the SA-508 forging materials used to make the RVs. If the WCAP analysis is not being relied upon in the CLB and the report needs to be credited for aging management during the period of extended operation, justify why the generic flaw growth analysis in WCAP-15338-A has not been identified as a TLAA.

Issue 2: Non-proprietary Westinghouse Report No. WCAP-15338-A provides a fracture toughness and flaw growth analysis for under-clad cracks that are postulated in the internal cladding of SA-508 Class 2 or 3 alloy steel components in Westinghouse-design RPVs. The flaw growth analysis in the WCAP is a generic TLAA for Westinghouse reactors that credit the report to manage under-clad cracking in their SA-508, Class 2 or 3 RVP forging components. The staff accepted the fracture toughness and flaw growth analyses in WCAP-15338 in a safety evaluation (SE) to the Westinghouse Owners Group (WOG) dated October 15, 2001. In this SE, the staff required license renewal applicants relying on the WCAP's generic methodology to respond to the following license renewal applicant action items (LRAAIs):

- (1) "The license renewal applicant is to verify that its plant is bounded by the WCAP-15338-A report (i.e., the number of design cycles and transients assumed in the WCAP-15338-A analysis bounds the number of cycles for 60 years of operation of its reactor pressure vessel)."
- (2) "Section 54.21(d) of 10 CFR requires that an FSAR supplement for the facility contains a summary description of the programs and activities for managing the effects of aging and the evaluation of TLAA for the period of extended operation."

Request 2:

If in response to Request 1, the generic flaw growth in WCAP-15338-A needs to be identified as a TLAA for RV underclad cracking, provide responses to the LRAAIs.

D-RAI 4.1-2

Background

In LRA Table 4.1-1, TLAA Category 6, "Plant-specific Time-limited Aging Analyses," the applicant stated that reactor coolant pump (RCP) flywheel fatigue crack growth analysis is not a TLAA. In LRA Section 4.7.4 the applicant further stated that an evaluation of the probability of failure over the period of extended operation for all operating Westinghouse plants was performed in WCAP-14535-A, "Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination," November 1996. The applicant noted that the evaluation demonstrates that the flywheel design has a high structural reliability with a very high flaw tolerance and negligible flaw crack extension over a 60-year service life (assuming 6000 pump starts).

Issue

Based on the evaluation in WCAP-14535-A the applicant concluded that since the flaw tolerance evaluation is based on the 60-year operating period rather than the current licensed operating period (40 years), it is not a TLAA under 10 CFR 54.3 Criterion 3.

Request

Clarify whether 60-year flaw growth analysis in WCAP-14535-A for the RCP flywheel discs is being relied upon in the CLB to support the inservice inspection interval for the RCP flywheels. If the WCAP analysis is not being relied upon in the CLB and the report needs to be credited for aging management during the period of extended operation, justify why the generic flaw growth analysis in WCAP-14535-A does not need to be identified as a TLAA for the LRA.