AP1000DCDFileNPEm Resource

From: Loza, Paul G. [lozapg@westinghouse.com]
Sent: Monday, August 24, 2009 3:51 PM
To: Donnelly, Patrick
Cc: Behnke, Donald H.
Subject: Acknowledgement of RAI-SRP6.2.2-SPCV-19 R2, and -21 thru -24

Patrick,

I acknowledge receipt for Westinghouse of RAI-SRP6.2.2-SPCV-19 R2, and -21 thru -24.

Thanks,

Paul

From: Donnelly, Patrick [mailto:Patrick.Donnelly@nrc.gov]
Sent: Friday, August 14, 2009 1:04 PM
To: Donnelly, Patrick; Loza, Paul G.; Behnke, Donald H.
Cc: Butler, Rhonda; McKenna, Eileen; Hebbar, Sudha; Hayes, Michelle; Snodderly, Michael; Hsii, Yi-Hsiung
Subject: AP1000 - New Draft RAIs - RAI-SRP6.2.2-SPCV-19 R2, and -21 thru -24

Don & Paul,

Below are 4 new draft RAI's on SRP6.2.2, and one RAI revision. Please let me know whether they are accepted or whether a conference call is desired.

Regards-

Patrick
****

RAI-SRP6.2.2-SPCV-21 WCAP-16914 Revision 1

a) The maximum flow rates identified in Table 5.2 are based on PXS operation after a DVI break in PXS room B, but these values are less than those provided in Table 1 of the Response to RAI-SRP6.2.2-SPCV-16(c), Revision 1, which describes the same event. Please explain the discrepancy and characterize the values extracted from the sensitivity report as average or bounding flows. Justify why the lower flow rates in Table 5.2 bound all PXS flow rates, including how IRWST flow to the broken line bounds IRWST flow through an intact line and how DVI flow through the intact line bounds flow through recirculation screen (RAI response shows recirculation screen flow is higher than DVI flow as recirculation screen also backflows to IRWST). Provide the source for the values used in the RAI response. Note 2 to Table 5.2 describes RNS initial injection from cask loading pit. Provide timing for when RNS injection switches from cask loading pit to IRWST.

b) DCD, Tier 2, Section 6.3.2.2.7.1 item 12 states that acceptable head losses have been demonstrated for the screens considering the maximum flow rate from operation of either the PXS or the RNS while the head loss tests were based on the lower flows from only PXS operation. The test report stated that the flow can reach the higher levels identified in the DCD if the RNS is operating, but that “the RNS does not have to operate in the unlikely event that the CR (or IRWST) screens collect the design amount of debris and that results in a higher head loss.” The staff interprets this statement to mean that the head loss testing did not bound operation of the RNS system, as required by the DCD. How will the DCD requirement to encompass RNS operation be reconciled to head loss testing performed using lower flow rates?

c) While the Westinghouse response to RAI-SRP6.2.2-SPCV-16 (f) stated that the test report would explicitly describe the fiberous debris preparation process and include pictures of the fibers in suspension, the staff did not find this in the report. Please provide this information, including if any fiber agglomeration was observed during debris addition.

d) In order to determine that the test was appropriately terminated, please describe the test termination criteria.

e) Item 2 on page 6-2 states that the initial water depth was 52.5". Please provide the actual height of the test screen so that the staff may evaluate if the modeled submergence is representative of the AP1000 plant.

f) The resultant pressure drop across the screen is greater than the submergence of the IRWST screen, so flashing may be expected per item 14 of "NRC Staff Review Guidance Regarding Generic Letter 2004-02 Closure in the Area of Strainer Head Loss and Vortexing". Please provide a flashing analysis, including details on use of containment accident pressure in the evaluation. If containment accident pressure was used, summarize the methodology used to determine the available containment pressure.

g) How were differences in flow rates and temperatures between sensitivity study and testing captured in pressure limit for testing.

RAI-SRP6.2.2-SPCV-22 Debris Generation/ZOI/Debris Characteristics

In the AP1000 design, where there are intervening components, supports, structures, or other objects, the ZOI is defined as the spherical region within a radius equal to 20 ID of the pipe break.

a) In order to determine if the AP1000 ZOI definition is consistent with the SE, please provide the ZOI radius/break diameter for the insulation types the AP1000 allows outside the ZOI , which is jacketed fiberglass, non-jacketed fiberglass, rigid cellular glass, or a suitable equivalent that does not add to the chemical precipitates.

b) From Table 3-2 of the SE, both Koolphen-K and Min-K have spherical ZOIs that exceed those used in the AP1000. Are either of these insulations allowed in the AP1000?

RAI-SRP6.2.2-SPCV-23 Upstream Effects

a) RG 1.82 C-1.1.1.5 requires that drains and other narrow pathways in flowpath potential break locations and the sump be designed so they are not blocked by debris. Westinghouse has addressed this issue for the flow from the Stage 4 ADS to the CR screen, but not for the flow from potential break locations to the CR screen. Please provide this evaluation, including a discussion of how the potential blockage of reactor cavity, refueling canal or refueling cavity drains were addressed.

b) For the wall-to-wall flooding case described in DCD 15.6.5.4C.3, the water level appears to be below the bottom of the IRWST screen. Because a pressure drop is now expected across the IRWST screen, evaluate the impact of vortexing, flashing, and potential water hold up in the IRWST as it drains down, and any impact this has on the DCD analysis.

RAI-SRP6.2.2-SPCV-24 Debris Source Term

a) The insulation allowed in the ZOI is described in the first part of the ITAAC from DCD,Tier 1, Table 2.2.3-4, item 8.c.ix. The required ITA is "inspection" of select insulation and the required AC is that the insulation be MRI or a suitable equivalent for all locations. While an ITA of "inspection" is appropriate for MRI insulation, the staff does not believe this ITA and AC combination is sufficient to determine that the insulation is a suitable equivalent. This option would most likely require additional ITA of "test" or "type test" and "analysis", and if a report is required to demonstrate the analysis, the AC would need to reference this report. Please provide the appropriate types of ITA and AC for this ITAAC.

b) Neither definition of suitable equivalent insulations (for either ZOI or flood up zone) in DCD Tier 2 Section 6.3.2.2.7.1 item 3 adequately captures the technical criteria required for an objective finding. For example, for suitable equivalent insulations in the ZOI, the staff expectation is that jet impingement testing be performed to either demonstrate there is no debris or to characterize the damage. Because there is no clearly defined protocol for this type of testing currently available, the results would need to be carefully evaluated to insure they were representative of plant conditions. If debris was generated in the testing, a transport analysis must also be included to demonstrate this debris will not arrive at any of the AP1000 filtering locations. Please include the specific testing and analyses required to demonstrate a suitable equivalent insulation and the objective criteria to be used to confirm the testing, transport analysis, and chemical analysis (as required for flood up zone) is adequate.

c) The portion of the ITAAC from DCD,Tier 1, Table 2.2.3-4, item 8.c.x dealing with caulking, tags and signs used in the flood-up zone or where there is sufficient water flow to transport this caulking, signs, and tags requires an inspection of the signs and confirmation a report exists concluding caulking and coatings have sufficient density. The staff feels this AC is not complete enough because the report should also include how the "area where there is sufficient water flow to transport" was determined. Explain where the ZOI definition, debris generation and transport analysis required to meet this ITA will be captured.

RAI-SRP 6.2.2-SPCV-19 Rev. 2 Component Analysis

a) Please explain the source of the Pressure, Temperature, and Design Flow values provided in the Rev. 1 response.

b) The Response suggests that because the design spec flow rate is 51% higher than the DCD specified flow rate, it is possible for large debris to reduce the overall screen area by 51% and still support the DCD specified flow. The staff believes having less than the designed screen area available during operation would increase the velocity and increase the pressure drop due to debris over the design basis. Please explain how the design flow rate is used in the design spec. The reduced area essentially represents a sacrificial screen area, which was not included in scaling for head loss testing. Please explain if the component analysis is taking credit for a sacrificial screen area due to large debris.

c) Response did not identify the design spec requirement for head loss. Please demonstrate how screens are designed to withstand head loss resulting from debris loading.

****

Patrick Donnelly
Project Manager
U.S. Nuclear Regulatory Commission
Office of New Reactors, DNRL/NWE2
T6F23
301-415-8584
PBD1@NRC.GOV

Hearing Identifier: AP1000_DCD_Review
Email Number: 265

Mail Envelope Properties (6F27D3A0E6C93E4A9212AD1F4FA57B600675DF9F68)

Subject: Acknowledgement of RAI-SRP6.2.2-SPCV-19 R2, and -21 thru -24
Sent Date: 8/24/2009 3:51:18 PM
Received Date: 8/24/2009 3:51:22 PM
From: Loza, Paul G.

Created By: lozapg@westinghouse.com

Recipients:
"Behnke, Donald H." <behnkedh@westinghouse.com>
Tracking Status: None
"Donnelly, Patrick" <Patrick.Donnelly@nrc.gov>
Tracking Status: None

Post Office: SWEC9966.w-intra.net

Files	**Size**	**Date & Time**
MESSAGE	9809	8/24/2009 3:51:22 PM

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