CCNPP3eRAIPEm Resource

From: Arora, Surinder
Sent: Monday, March 10, 2014 8:18 AM
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Cc: CCNPP3eRAIPEm Resource; Segala, John; Wilson, Anthony; Hearn, Peter; McLellan, Judith; McKenna, Eileen; Wheeler, Larry
Subject: CCNPP3 - Draft RAI 417 BPTS 7388
Attachments: DRAFT RAI 417 BPTS 7388.docx

Paul,

Attached is DRAFT RAI No. 417 (eRAI No. 7388) pertaining to Chapter 9 of the Calvert Cliffs Unit 3 FSAR. The draft question (in several parts) is a follow up to the UniStar's response to the staff's previous RAI 398 (eRAI 7198) and the UHS audit conducted by the staff. Please note that this item is an open item in the staff's safety evaluation (SE) and needs to resolved before the staff can document its final determination in the SE. You have until March 24, 2014 to review the draft question and request a clarification phone call to discuss the RAI before the final issuance. After the clarification phone call or after March 24, 2014, this draft RAI will be finalized and issued to you for providing your response. You will then have 30 days to provide a technically complete response or an expected response date, as applicable.

Thanks

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Request for Additional Information 417 (eRAI 7388)

DRAFT
Issue Date: 03/10/2014
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Operating Company: UniStar
Docket No. 52-016
Review Section: 09.02.05 - Ultimate Heat Sink
Application Section: 9.2.5

QUESTIONS

09.02.05-33

This RAI is a Follow-up to RAI 398 (eRAI 7198), Question 09.02.05-30

The staff reviewed the applicant's response to RAI 398, Question 09.02.05-30, and has identified several additional items that need to be described or included in the RAI response and/or the FSAR. Under the items below, the section of the RAI response for which the staff seeks additional information is listed, followed by the staff's questions and/or comments.

Item 1:

From Part A. Item 1 (paragraph 4):

CFD runs for wind speeds of 1 m/s, 2.5 m/s, 5 m/s, and 10 m/s at 60-m elevation for operating scenario B, wind direction sector 007 were used to show that the worst case reingestion/recirculation condition for that scenario within the range of realistic wind speeds for the site ($\leq$ 10 m/s at 60-m elevation) occurs near a wind speed of 10 m/s at 60-m elevation.

Staff's Question/Comment:

1.a. Provide (quantitatively) the intake wet-bulb temperature for velocities of 1, 2.5, 5, and 10m/s (Scenario B, Sector 007).

Item 2:

From Part A. Item 1 (paragraph 5):

CFD runs for wind speeds of 1 m/s, 2.5 m/s, 5 m/s, and 10 m/s at 60-m elevation for operating scenario E, wind direction sector 013 were used to show that the worst case reingestion/recirculation condition for that scenario within the range of realistic wind speeds for the site ($\leq$ 10 m/s at 60-m elevation) occurs near a wind speed of 5 m/s at 60-m elevation.

Staff's Questions/comments:

2.a. Provide (quantitatively) the intake wet-bulb temperature for velocities of 1, 2.5, 5, and 10m/s (Scenario E, Sector 013).

2.b. Justify not considering 7.5 m/s in this case (Scenario E, Sector 013). Given the location of the predicted peak, 7.5 m/s would seem to be an important value to consider.

Item 3:

From Part A. Item 1 (paragraph 7):

….Wind speeds of 5 m/s and 10 m/s at 60-m elevation were evaluated for operation scenario B, wind direction sector 007. The 10 m/s at 60-m elevation case remained valid. Operating scenarios E and

A for wind direction sectors 013 and 014, respectively, were evaluated only at a wind speed of 5 m/s at 60-m elevation. The results confirmed the ordering established by the zero buoyancy cases.

Staff's Questions/Comments:

3.a. Discussion is in the context of whether the initial zero buoyancy cases for operating scenarios B and E would remain valid for CFD analyses of these scenarios under fully buoyant conditions. It is not clear from the statement whether this implies that for the 5 m/sec wind case that the initial non-buoyant results did not agree with the fully buoyant results, but the 10 m/sec wind speed case did. Clarify this discussion.

3.b. Clarify not evaluating the 10 m/sec wind speed for operating scenarios E and A.

Item 4:

From Part A. Item 1 (paragraph 8):

….A finer discretization of wind angle covering wind direction sector 007 in so increments was added to yield a better estimate of the peak value.

Staff's Question/Comment:

4.a. Wind direction sector 007 corresponds to winds from the southeast sector with a centerline value of 135 degrees. In drawing SK-SITE-SL-1, the worst-case wind direction is identified as 130 degrees. Confirm the other wind angles evaluated in that sector. Also, because the resultant wet-bulb temperature increase (including the sum of the incremental increase and uncertainty) is now closer to the threshold 2.5 ^{o}F allowance in the DC, justify not evaluating an incremental wind direction smaller than 5 degrees.

Item 5:

From Part A. Part 1 (paragraph 8/9):

….The worst case intake wet bulb temperature increase was assessed to be 2.28 °F occurring at cooling tower URB3. The mesh convergence study at this condition and wind angle quantified the uncertainty of the prediction at URB3 to be approximately 3.5%, yielding an upper estimate for the wet bulb temperature 2.36 °F (2.28 ± 0.08 °F) rounded up to 2.4 °F.

This increase in the wet bulb temperature is bounded by the 2.5 °F allowance in the increase of the inlet air wet bulb temperature for the ESW cooling towers in U.S. EPR FSAR, Revision 5, Table 9.2.5-2.

Staff's Questions/Comments:

5.a. Uncertainty is estimated from a mesh convergence study at one set of conditions. The impact of mesh size is not the only source of uncertainty for a CFD analysis. Describe if other uncertainties need to be considered and addressed. if not, please provideyour justification because this raises the question of whether the 2.4 degrees F value is a good estimate for the upper bound of the wet bulb temperature.

5.b. Describe the calculation input parameters margins, alignment of metrological condition, and heat loads into calculating the UHS cold water return temperature knowing that the CFD results may not result in a bounding cooling tower intake wet bulb temperature, but more of a range of possible intake wet bulb temperature. Calculation margins and weather alignments may include, but not limited to, the initial UHS basin temperatures (UHS towers in service), wind direction, wind speed, time of day, day of the month, and changing design heat loads over time.

Item 6:

From Part A. Item 3 (paragraph 3) and footnote:

The ‘zero percent exceedance temperature values’ limited to occurrences of wind directions from the east were determined to be 91°F dry bulb temperature with a coincident wet bulb temperature of 75.5°F. The zero percent exceedance temperature values limited to occurrences of wind directions from the south-east were determined to be 98.5°F dry bulb temperature with a coincident wet bulb temperature of 82.5°F.

The ‘zero percent exceedance dry bulb temperature value’ is the highest value than can occur for consecutive hours and can only be exceeded one hour at a time (no consecutive hourly temperature values can exceed it). The zero percent exceedance coincident wet bulb temperature value is the wet bulb temperature value that occurs at the same time as the zero percent exceedance dry bulb temperature value.

Staff’s Question/Comment:

6.a. Clarify zero percent exceedance temperature values. It is not clear whether the coincident wet-bulb temperatures represent the maximum of the coincident wet-bulb temperature for a given direction, the mean coincident wet-bulb temperature for a given direction, or some other statistic.

Item 7:

From Part A. Item 5:

The large break LOCA heat load is 194.2 MBTU/hr. which is an approximate one-hour average of the heat load from a design basis accident (Large Break LOCA) during its peak input to the UHS cooling tower.

Staff’s Questions/Comments:

7.a. Clarify the UHS heat load bases. The peak UHS heat load of 194.2 MBTU/hr could not be located in the DCD or C. Cliffs FSAR. See US EPR DC Table 9.2.5-1 (has Max.318.77 MBTU/hr).

7.b. Confirm the initial UHS basin temperature for the cold water return temperature.

Item 8:

From Part B. Item 1 (paragraph 6):

A finer grain discretization of wind speed and wind direction was not performed because the available design margin far exceeded the wet-bulb temperature increase.

Staff’s Question/Comment:

8.a. Clarify the margin is in the RAI response. Also, consider adding this discussion to the FSAR, Page 2-8.

Item 9:

From Part B. Item 1 (paragraph 7):

CFD runs for two other conditions, operating scenarios A and B, wind direction sectors 008 and 014, respectively, were added because the non-buoyant runs indicated that these cases might have potential for cooling tower plume ingestions. The quantified values for wet-bulb temperature increase at the HVAC intakes for these cases remained below the values quantified for operating scenario A, wind direction sectors 004 and 005 discounting these cases as ones of concern.

Staff's Questions/Comments:

9.a.Justify performing the wind directions sectors 008 and 014.

9.b. Justify not performing section 2.

Item 10:

From Part B. Item 4 (paragraph 1)

If a condition existed within the NABVS such that the safety related function of the downstream systems could be adversely affected, including excessive moisture or temperature in the air supply, the air supply can be manually isolated for each affected system utilizing the safety related supply dampers.

Staff's Questions/Comments:

10. a. Clarify which safety-related damper can be closed to perform this isolation.

10. b. Describe the detection of excessive moisture or temperature; such as the use of, control room alarms or control room indications.

Item 11:

From Part B. Item 17

A footnote to FSAR Table 2.0-1 has been added which points to FSAR Section 9.2.5.3.3.

Staff's Questions/Comments:

11.a. Consider adding a new footnote be supplemented with additional information indicating the appropriate sub-heading(s) and a cross-reference to U.S. EPR FSAR Table 9.2.5-2.

11.b. Verify that all sections of the COL FSAR which describe "0% exceedance value" are consistent. Discrepancies have been found in COL FSAR Table 2.0-1 (Note J- less than two hour duration) and FSAR Section 9.2.5.3.3 (two consecutive data occurrences).

Item 12:

From Part B. Item 18:

As discussed in Calvert Cliffs Unit 3 FSAR Section 9.2.5, for the transient condition relating to the non-coincident wet bulb temperature of 85°F that would exceed the zero percent exceedance coincident 80°F wet bulb design temperature in Calvert Cliffs Unit 3 Table 2.0-1, the potential increase in wet bulb temperature due to UHS Cooling Tower plume interference is considered a variance that has been analyzed to be acceptable.

Staff's Question/Comment:

12.a. The term "variance" applies to COLAs that reference an ESP application which is not the case with the CCNPP Unit 3 COLA. This term is also used in COL FSAR Subsection 9.2.5.3.3, Para. 6, under the sub-heading "Design Inlet Wet Bulb Temperature". Confirm whether the appropriate terminology has been used and whether this should be referred to as a departure "that has been analyzed and found to be acceptable".

Item 13:

From SK-SIT SL-2 drawing:

Staff's Question/Comment:

13.a. Consider adding the compass azimuth (east 90 degree) on the site north arrow for clarity.