PMSTPCOL PEmails

From: Tai, Tom
Sent: Monday, August 01, 2011 3:46 PM
To: Price, John E
Cc: STPCOL
Subject: August 1, 2011 Wednesday Call - 3.9.2 Questions

John,

Including last week's questions, I have a new one today from Dr Samir Ziada. The following captures all six (6), in the same order that were given to you:

1. Analysis Case 4: Ten pumps in-phase and maximum flow rate (i.e., [111%] of core flow). This produces symmetric flow distributions within the reactor vessel. Thus, maximum reactor coolant dynamic pressures would be present in the reactor core and in regions above the core (e.g., top guide and steam separators). This case is bounding because the [111%] flow rate in the maximum achievable at the 100% power level. In WCAP-17371-P, Rev. 2, Section 5.1.2 the applicant stated that the analyses for the internal components, except for the CRDH/CRGTs, ICGT/ICMHs, and stabilizers were done at a more conservative flow rate of [120%].

   The staffed noted that only large components in downcomer (i.e., core shroud, shroud support, and shroud head) were analyzed with 120% flow rate in Analysis Case 4 as stated in WCAP-17371-P, Rev. 0, Section 6.2.1. Small components in downcomer (FW and LPCF sparger, RIP Guide Rails) and components above the core (steam separators and lifting rods, HPCP sparger and coupling) and component in lower plenum (CP and RIP DP lines) were not analyzed with a more conservative flow rate 120%.

2. In response to RAI 03.09.02-26 dated November 4, 2010, the applicant listed 4 tests which were performed to validate the CFD approach. These tests include cases of separated flow, rotating flow, branched flow, and turbulent flow. The validation tests results have been compared with theoretical or measured results, and it was concluded that the CFD results were sufficiently accurate for these test cases. Additional validation of the CFD model of the lower plenum was performed by comparing the velocity distributions of Case 4 conditions along a vertical measurement line with the 1/5th scale model test data. Although, good agreement was found between the velocity distribution patterns, the simulation results underestimated the maximum radial inward velocity by 18%. The applicant therefore accounted for this difference by including an additional safety margin of 18% to the computed FIV stresses. We need confirmation that this additional margin is included in the lower plenum component (i.e., CRGT/CRDH assemblies, ICGT/ICMH assemblies, stabilizers, CP DP lines, and RIP DP lines)

3. **WCAP 17385 - Section 5.5.3.6**

   A full penetration weld is "assumed" for every weld in the dryer and a welding factor of 2 is applied throughout the dryer stress evaluation. This is a major assumption, please validate this assumptions (i.e., all welds are penetration welds).

4 **WCAP 17385 - Section 5.5.3.4**

   Dead-weight stress is included in the load combination but not the thermal stresses. The report stated that the thermal stresses are small because the entire steam dryer is suspended inside the reactor vessel and all surfaces are exposed to the same conditions. However, the staff noted that there are constrains (boundary conditions) used in the dry structural model. Please provide justification that

thermal stresses under these boundary conditions are small and insignificant compared to the dryer FIV stresses (i.e., to validate the assumption).

5. **Section 5.5.5.2 of WCAP-17385-P, Rev. 2.**

   The stress ratio of the dryer is calculated as:

   Stress ratio = 9.95/ ((2.996**2 + (4.216 x 2)**2)**0.5) = 1.11

   In the above calculation, the stress component due to the MSL-induced acoustic (i.e., 4.216 ksi) is multiplied by a factor of 2 to account for the end-to-end uncertainty and bias in the analyses. However, the uncertainty and bias is not considered for the stress intensities induced by the non-MSL acoustic (i.e., 2.996 ksi).

6. **WCAP 17370-P Rev 2**

   In Section 6 of the WCAP-17370-P, Rev. 2, the applicant states that "the difference between the acceptance criteria and the component measurement must be less than the greater of the biases and uncertainties or 12%), where the uncertainty includes the measurement uncertainty."

   Please explain more clearly the meaning of this statement and provide evidence that it will lead to conservative results.

These will be some of the agenda items for Wednesday's (8/1/11) call.

Regards

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