

PRELIMINARY REQUEST FOR ADDITIONAL INFORMATION

RAI Regarding the Licensee's Letter of October 19, 2001

1. You stated in the letter, that "The results of the Structural Integrity Associates, Inc., analysis show that the VHP nozzles would have a leakage path to the RPV head surface with initial interference fits through 3 mils." In Section 6.0 of the Structural Integrity Report, it was stated clearly that, "all nozzles show a very lightly loaded residual interference zone just above the J-groove weld for all initial interferences." Further, even for cases with annular pressurization, it was stated that, "The results of these pressurized analyses indicate that, except for the lightly loaded ring just above the J-groove weld, all nozzles exhibit a leak path even with an initial interference fit up to 3 mils." How is the conclusion of your letter consistent with the findings in the SIA report?

RAI for SIA report, "Finite Element Gap Analysis of CRDM Penetrations (H. B. Robinson)."

1. How was the inner compression surface radius determined?
2. The report indicated that the bottom ring of the interference zone are very lightly loaded for all initial interferences. Provide the range of loads for the bottom ring of CRDM Tube 1 shown in Table C-1 as an example and describe the significance of these "very light loads" in keeping the fluid from passing through.

RAI for DEI report, "Results of Reactor Vessel Top Head Nozzle Operating Fit Analysis (H. B. Robinson)."

1. In your FEM model, you applied enforced displacements of 0.004 inch radially (outward) at the midpoint and 0.008 inch radially (outward) at the bottom surface of the weld-tube interface to account for J-weld shrinkage. The J-weld has three boundaries: one with vessel head, one with penetration tube, and one of free surface. During weld solidification, the free surface of the J-weld will move to accommodate the shrinkage of the weld, leaving the other two boundaries virtually unchanged. Historically, weld solidification would only lead to residual stresses in the weld. Provide justification that weld solidification will also lead to an applied load (enforced displacement is a form of applied load) acting on the welded parts.
2. With the enforced displacements in the J-weld due to weld shrinkage and an annulus with vessel fluid of 2235 psi, the FEM results showed that there are still 7 nozzles (out of 13 nozzles in the 45 deg FEM model) without a predicted leak path for an initial interference of 0.003 inch. You have provided three qualitative arguments to override your analytical results: (1) low contact stresses in the interference region, (2) short interference length, and (3) experience. Provide justification based on documented test results or field findings for these qualitative arguments.