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Docket No. 50-305

R. C. DeYoung, Assistant Director for Pressurized Water Reactors, L

EVALUATION OF RESPONSE TO QUESTIONS REGARDING CONTAINMENT ANALYSIS BY THE APPLICANT KEWAUNEE

Plant Name: Kewaunee Nuclear Generating Plant
Licensing Stage: Safety Evaluation
Docket Number: 50-305
Responsible Branch: PWR #2
Project Manager: L. Crocker
Requested Completion Date: Not specified
Review Status: Incomplete
Applicant's Response Date: As soon as possible

We have reviewed the applicant's response to our questions concerning the containment pressure analysis. The response was insufficient for us to complete our review of the containment system. We have prepared a listing of areas where additional information should be provided by the applicant to enable our review to be complete.

1. Conservatism of blowdown model:

   a. Describe and reference the heat transfer correlations used to calculate heat flow in the steam generators for both the primary and secondary surfaces. Curves of heat flow as a function of time for the most severe break size and location should be provided.

   b. The basis for reduction of initial stored energy in the core and primary coolant should be provided and the probability of exceeding these values during operation should be discussed.

   c. It is stated that the LOCTA code is used to calculate core energy release while the SATAN code is used to simulate the various system breaks. The suitability of performing the two analyses independently should be discussed and the method by which the core heat release calculated by LOCTA is added to the containment should be identified.

   d. It is stated that the transition boiling correlation in the LOCTA code and the DNB time were modified to ~~obtain a high heat release rate. These modified~~

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correlations should be provided and differences from the model used in the SAR analysis should be discussed. Suitable justification should also be provided to ensure that core heat transfer is, indeed, conservatively analyzed for maximum containment pressure.

e. The refill calculations are begun at the end of blowdown with the assumption that water has been left in the vessel at a level equal to the bottom of the core. It is not apparent, however, that the water left at the end of blowdown will be subcooled at 150°F as is assumed. This is an apparent inconsistency with the assumptions of the SATAN code which takes credit for the quenching effect of the accumulator water as it is brought to thermodynamic equilibrium with the primary system. The analysis should be modified to account for a more realistic condition (saturated) of the water remaining in the vessel at the end of blowdown.

2. Reflood Model

a. With the assumption that saturated fluid remaining in the vessel at the end of blowdown enters the core first during reflood, provide revised carryover mass fraction information for fluid ejected from the core.

b. It appears that figure 14.C-4 is in error. We have examined the data from FLECHT run No. 6948 and considering their application to containment analyses, we cannot conclude that the core would be quenched to produce zero steam production at the 8-foot or 10-foot level. The analysis should provide evidence that all sensible heat is removed from the core at time of quench.

c. The model used in the reflood analysis should be described or referenced. Describe the heat transfer correlations and assumptions used to calculate heat transfer from the internals and steam generators. Justify any core heat that is assumed lost to the steam generator tubing during the reflood period which does not reach the containment. Tabulate the resistances used in the reflood analysis. If these resistances were determined for nominal values, describe the method used to extrapolate them to reflood conditions. Consider the effect on reflooding rates and containment pressure if the pumps were free spinning instead of in the locked condition.

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d. Recent FLECHT tests have exhibited considerable chugging of water in the core and downcomer. Provide analyses showing the effect on containment pressure of any water carried into the steam generators of the intact loops from the injection points in the cold legs.

3. Selection of most severe break:

a. The break identified in Amendment 22 to provide the maximum containment pressure is the 3 sq. ft. pump suction break. It is not apparent, however, that this is the most severe break size between the full double-ended pump suction break and smaller breaks. In addition, analysis of small hot let breaks have not been analyzed as requested in our questions. Provide additional analyses to demonstrate that the worst break size and location has been selected for both hot and cold leg breaks.

b. Your analysis considers that partial sprays and fans are actuated at 60 seconds. This may not be conservative for small breaks if only sprays are actuated by containment pressure. Discuss this affect on your analyses.

c. When the most severe break size and location have been identified, mass and energy flows to the containment and the core velocity should be provided, including accumulator flow to the vessel and containment. The curves provided in Amendment 22 were for the double-ended pump suction break which is not the worst case.

Original signed by:
R. L. Tedesco

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