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Docket No. 50-390
and 50-391

DEC 5 1980

Mr. L. M. Mills
Tennessee Valley Authority
500A Chestnut Street, Tower II
Chattanooga, Tennessee 37401

APP/3

Dear Mr. Mills:

SUBJECT: CONTAINMENT VESSEL BUILDING ANALYSIS FOR WATTS BAR NUCLEAR PLANT

After reviewing your February 19, 1980 responses to our questions, we and our contractor require further clarification to some of our questions. Attached is a list of the revised questions generated by our review.

We require your clarification of these matters by February 16, 1981 to assure expedient completion of our review.

Sincerely,

Original signed by:
Robert L. Tedesco

R. Tedesco

~~A. Schwencer, Chief~~
~~Licensing Branch No. 2~~ Asst. Director for Licensing
Division of Licensing

Attachment:
As stated

cc: See next page

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|---|---|---|---|---|---|---|
| SURNAME | TKenyon/ph | ASchwencer | RTedesco | | | |
| DATE | 12/4/80 | 12/4/80 | 12/4/80 | | | |

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Spring City, Tennessee 37831

REVIEW OF TVA's
RESPONSES TO QUESTIONS
SUBMITTED APRIL 9, 1979

Question 2:
Provide a description of how the buckling curves contained in the report were applied to the buckling of the containment vessel. The description should include the application of these buckling curves to asymmetric dynamic loads in the areas where penetrations are present.

Review of Answer 2:
We are still concerned for the reliability of the buckling analysis. The behavior of the shell in the vicinity of the penetrations does not appear to have been modeled accurately in both the dynamic and buckling analysis. Thus the effect of stress concentrations near the openings and the adequacy of the stiffening around the opening are uncertain. There is virtually nothing in the literature on the amount of stiffening required to nullify the opening from a buckling point of view. The present analysis therefore assumes that the stiffening has the desired result without any verification.

Questions 4:
Provide a description of the assumptions involved in modeling the containment vessel in order to use the programs identified in Question 3. This description should include a discussion of any convergence and/or accuracy checks that were made.

Review of Answer 4:
For the axisymmetric shell, the convergence check is acceptable. However, for the shell containing penetrations, it appears that no checks for convergence or accuracy were carried out for the stresses in the area of the penetration. Since the stresses around the penetrating may trigger buckling, the solution accuracy should be investigated.

Question 6:
Explain the procedure of obtaining the stress distribution in the shell using lumped mass beam model instead of a shell model for the dynamic seismic analysis.

Review of Answer 6:
The use of the Timoshenkon shear beam as an analog for a perfect (without penetrations) shell of revolution is acceptable; however, for the containment vessel under discussion there is no documentation or justification that this simplistic approach is applicable, and that it will not suppress shell modes in the real structure that will be excited by seismic ground motion.

Question 7:
Explain the justification for using an axisymmetric geometry computer program for the containment vessel.

Review of Answer 7:
Although the answer to question 7 states that the approach to analyzing the locks and hatches as a supported subsystem was used for the dynamic analysis of nuclear plants, it does not address the question of the accuracy of this approach for dynamic buckling analysis. Further justification of this approach is needed.

Question 9:
Explain in detail the criteria and its justification for determining the interaction effects between the containment shell and the attached equipment.

Review of Answer 9:
By doing a separate analysis for the supported equipment, the effect of the equipment on the containment shell is neglected. Thus the effects of interaction between the motion of the shell and its attachments are not properly handled. Recent studies in the published literature (PO, BSSA, April 1979) have shown that significant interaction can develop under seismic excitation even if the mass ratio of the equipment is on the order of one percent of the main structure.