Docket No. 50-267

Date: 2/13/87

Note to: Docket Files 042

From: K. L. Heitner P-234
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Subj: Attached Draft
Document

The attached draft document has been provided to the Public Service Company of Colorado. In accordance with NRR Office Letter No. 43, we request that you provide copies to the NRC and Local PDR's

K. L. Heitner

ATTACHMENT

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1. The "primary stress" loading for this event is identified as the case where helium pressure and temperature combine with zero pressure in the tubes (page 4), which may lead to creep buckling collapse of the tubes. This is considered to be equivalent to an ASME level "D" event. However, such events include concurrent dynamic loading due to SSE. These effects have not been included in the analysis. Therefore justification is needed for this exclusion.

2. The effects of flow induced vibration and seismic loading should be included in the evaluation of the structural integrity of the primary pressure boundary of the steam generator with large temperature differences (page 5), or the exclusion should be justified.

3. On page 6 justification should be provided for the statement that "tube buckling will not occur in the small-radius bend because the double curvature of the tube wall provides extra stiffness."

4. The use of the nominal wall thickness may be non-conservative if any erosion/corrosion of the wall has occurred due to the flow of steam. Justification should be provided for showing why this effect may be neglected (page 6).

5. Some indication is needed that the creep buckling program BUCKLE has been evaluated and accepted by the staff (page 6).

6. On page 8, the definition of "maximum local stress" needs clarification. Is this an effective stress? Does this include stresses due to bending and torsion?

7. Bending of curved tubes induces an ovalization which should be added to the initial (manufacturing) ovality unless it is shown to be negligibly small.

8. In Table 4.1 (page 11) provide the basis for the calculation of the ovality, as shown in the note to this table.

9. On page 17 the statement is made that "values of ovality were not available from the BUCKLE code." Provide justification for this, and for the statement that failure is predicted to occur when the ovality at a specific temperature and pressure reaches that value which causes the stress in the tube to reach yield stress. How is this ovality determined? Why aren't values of ovality available from BUCKLE?

10 Provide justification for the two assumptions on page 17. Indicate how the parameters to calculate the exponential rate of change of ovality with time were determined.

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11. On page 18, indicate how the ovality to cause instantaneous buckling was determined.

12. The methodology and results on pages 17 thru 31, to assess the likelihood of creep instability under varying pressure, should be evaluated independently by the staff. It is not clear that BUCKLE can account for non-linear geometric effects.

13. On page 31 justification or proof is needed for the statement "the tube could probably collapse to a flat strip and not rupture the material."

14. In the analysis of the reheater helical bundle provide the detailed methodology for applying the hinge concept to curved tubes subjected to biaxial bending, torsion and axial loads.

15. Provide justification for not including moments due to sustained and transient loading (such as seismic and flow induced vibration) in determining the maximum moments for hinge location.

These questions concern the integrity of the steam generators during firewater cooldown