UNITED STATES
NUCLEAR REGULATORY COMMISSION
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NRC pdr

MAY 3 1979

General Electric Company
L. J. Sobon, Manager
BWR Containment Licensing, MC 905
175 Curtner Avenue
San Jose, California 95125

Dear Mr. Sobon:

On December 28, 1978, you submitted the first part of the "Mark I Containment Program Load Definition Report," NEDO 21888, on behalf of the Mark I Owners Group. This document describes the generic suppression pool hydrodynamic load definition techniques for the Long Term Program.

We have completed our review of the first part of NEDO 21888 and its related references. As a result, we find that we will require additional information in order for us to complete our review. When we complete our initial review of Part B of NEDO 21888, which was submitted on March 15, 1979, an additional information request will probably be necessary.

The enclosed questions and the schedule for your responses have been discussed in recent meetings between the staff and representatives of General Electric and the Mark I Owners Group. Should you require any further clarification, contact C. Grimes (301-492-7110).

Sincerely,

Darrell Eisenhut

D. Eisenhut, Deputy Director
Division of Operating Reactors

Enclosure:
As stated

cc w/enclosure:
See next page

7905230849

cc w/enclosure:
L. S. Gifford (GE Bethesda)
R. Kohrs (GE)
L. Steinert (GE)

REQUEST FOR ADDITIONAL INFORMATION

MARK I LONG TERM PROGRAM

LOAD DEFINITION REPORT AND RELATED REFERENCES

1. Discuss the significance of the break sizes assumed for the small and intermediate break accidents as they relate to the load magnitudes and durations. Justify that these break sizes will sufficiently define the spectrum of accident conditions for the suppression chamber structure.

2. The typical plant containment response is not adequately described in Section 4.1.1 of the Load Definition Report. Therefore, provide the following additional information relative to the typical plant containment response:

   a) Primary system mass and energy release rates for all three break sizes.

   b) Drywell temperature transients for all three break sizes.

   c) Vent system mass flux and air content transients for all three break sizes.

   d) Temperature response for the comparative DBA steam line break.

   e) Clarify the index times (i.e., t_1, t_2, t_3, and t_4 in Table 3.0-2) for all three break sizes as discussed in Sections 4.4 and 4.5 of the Load Definition Report.

3. Justify the use of the average suppression pool temperature for the design basis accident suppression chamber pressure transient and vent system thrust loads, rather than two separate analyses at the maximum and minimum suppression pool temperature which would establish limiting loading conditions for both the suppression chamber pressure and vent system thrust loads. Your response should address the relative significance of these two loading conditions.

4. Provide the following additional information relating to the vent system flow losses.

   a) Describe the method used to calculate the vent system overall loss coefficient.

   b) Provide a sample calculation of the vent system loss coefficient for the typical plant identified in Table 4.1.1-3.

c) Clarify the reference to the term "fl/d" in Section 4.3.1.1.a.

d) Discuss the manner by which the flow loss coefficient calculational technique has been verified by the EPRI test results.

5. Clarify the "miter angle" for the main vent (θ_3,α) thrust load, as discussed in Table 4.2-1.

6. Describe the manner by which the flow distribution factors defined in Figure 4.2-13 will vary with the vent flow rate.

7. Describe why the direction of the F2H thrust load is defined in the plane of the header miter, rather than the plane of the vent header. This discussion should address the potential for and consequences of local bending in the vent header.

8. Provide a typical experimental vent system flow loss coefficient as a function of time, and identify the specific test run from which the function is derived.

9. Describe how the torus submerged pressure azimuthal and longitudinal multipliers in Section 4.3.2 have been defined. Justify that the technique used will provide a conservative load definition for both the torus net vertical load definition (torus gross motion) and local pressure definition.

10. Describe and justify the manner by which the torus submerged pressure histories and the torus airspace pressure history will be connected spatially and temporally for the plant-unique structural analyses.

11. Describe how the sensitivity tests performed in the Quarter-Scale Test Facility will be used for the pool swell load definition in the Long Term Program. Identify the limitations on the use of sensitivity parameters.

12. Describe and justify the method used to define the plant-specific values of Δt_z, Δt_θ, t_2, t_3, and t_4.

13. Describe the manner by which the froth load fluid densities and direction of application have been derived and discuss why the fallback loads have been limited to drag. Justify that this technique will provide a conservative load definition.

14. Provide analysis of the shortest time that it takes for the steam released from a hypothetical design basis accident to pass through the vent system to the downcomer exit. Justify not specifying a gross asymmetric loading condition for either the vent system or the torus due to potential maldistributions in the vent flow composition.

15. Excessive suppression pool thermal stratification could lead to higher wetwell airspace pressures and temperatures, higher condensation oscillation loads, and a greater potential for steam bypass of the suppression pool. Comparisions of calculated and experimental wetwell pressures from the Humboldt Bay and Bodega Bay test facilities were presented in the Downcomer Reduced Submergence Functional Assessment Report (NEDE-21885-P) to support condensation effectiveness. However, these comparisons did not consider the effects of incomplete air carryover and atypical condensation on structures which could mask thermal stratification effects. Further, GE licensee data have shown that only a fraction of the pool participates in long-term condensation. Therefore, provide the following additional information relating to the potential for and effects of pool thermal stratification.

    a) Provide a comparison of the calculated and experimental torus pressures and temperatures from the Full-Scale Test Facility. Discuss the differences and specifically address the potential for incomplete air carryover and condensation on the torus shell.

    b) Provide an analysis of the pool vertical velocity during Residual Heat Removal pool cooling for typical systems, both with and without discharge nozzles, for several distances away from the discharge point, to demonstrate pool mixing capability.

16. The Seismic Slosh Evaluation Report (NEDC-23702-P) provides a comparison of the calculated and experimental slosh wave amplitudes. However, this comparison does not consider the relative accuracy of the analytical model, which must be quantified to preclude downcomer uncovery due to seismic waves. Therefore, provide a comparison of a full-scale prototypical analytical result with scaled-up experimental results which can be used to establish the margin of safety in the analytical model.

17. The EPRI three-dimensional pool swell tests are used to establish the "sweep-time" for vent header impact. However, it appears that the sizing of the downcomer orifices for the EPRI tests may have exaggerated the pool swell resulting in a non-conservative estimate of the header sweep time. Therefore, justify the sizing of the orifices in the EPRI test facility as it relates to the flow distribution through the vent system.