July 16, 1985

Docket No. 50-29
LS05-85-07-023

Mr. George Papanic, Jr.
Senior Project Engineer - Licensing
Yankee Atomic Electric Company
1671 Worcester Road
Framingham, Massachusetts 01701

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Dear Mr. Papanic:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON TMI ACTION PLAN ITEM II.D.1, PERFORMANCE TESTING OF RELIEF AND SAFETY VALVES

Re: Yankee Nuclear Power Station (Yankee)

By letters dated March 30, 1982, July 1, 1982, August 1, 1982, December 28, 1982, April 1, 1983 and April 2, 1984, you provided information related to performance testing of safety and relief valves. Based on our review of this information, we have identified some issues for which we need additional information to complete our review.

We request that you provide a schedule for providing a response to the enclosed request for additional information within 30 days of receipt of this letter.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Original signed by:

John A. Zwolinski, Chief
Operating Reactors Branch #5
Division of Licensing

Enclosure:
Request for Information

cc w/enclosure:
see next page

DL: ORB #5	DL: ORB #5	DL: ORB #5
CJamerson	JClifford:jb	JZwolinski
7/15/85	7/15/85	7/16/85

SE01
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cc:
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Radiation Control Program
Massachusetts Department of Public Health
150 Tremont Street, 7th Floor
Boston, Massachusetts 02111

REQUEST FOR ADDITIONAL INFORMATION

TMI ACTION NUREG-0737 (II.D.1)

FOR

YANKEE

DOCKET NO.: 50-029

JUNE 1985

QUESTIONS RELATED TO THE SELECTION OF TRANSIENTS AND VALVE INLET AND DOWNSTREAM CONDITIONS

1. The submittal does not include a discussion of consideration of single failures after initiating events. NUREG-0737 requires selection of single failures that produce maximum loads on the safety and relief valves. Include a discussion describing how the single failure considerations are met.

2. Overpressure transients will cause the pressurizer sprays to activate adding moisture to the steam volume. When the safety valves lift or the PORVs are opened they would be passing a steam-water mixture. Provide a discussion on whether this effect was considered in the analysis done to select the transient that produced maximum loads on the discharge piping.

3. The Yankee submittal did not discuss the feedline break event. NUREG-0737 II.D.1 requires that the transients of Regulatory Guide 1.70 Revision 2 be considered. The feedline break is included in these transients. Discuss the feedline break event providing peak pressure, pressurization rate, temperature, discharge flow rate and expected fluid. Demonstrate safety and PORV functionability for this event, and consideration of this event in the discharge piping analysis.

QUESTIONS RELATED TO VALVE OPERABILITY

4. The submittal states that the safety valves are to be replaced by Dresser Model 31719A safety valves. The final safety valve operability report did not provide sufficient detail to allow a complete evaluation of valve operability. Provide additional information that contains:

(a) The safety valve ring settings in the Dresser safety valves tested in the industry sponsored program were different from the ring setting in the new Yankee safety valves. Discuss how the ring settings for the Yankee safety valves were determined and the expected performance at these ring settings.

(b) Provide the expected backpressure on the safety valves and the effects on performance,

(c) Provide a discussion of the expected blowdown for the safety valves. If the blowdown is expected to exceed the ASME Code limit of 5%, discuss the effects of the higher blowdowns on safety valve operability and plant safety,

(d) Verification of valve flow capacity that meets the plant specific FSAR flow capacity,

(e) Provide a discussion on the expected stability of the new Yankee safety valves. A method recommended by the EPRI test program to demonstrate valve stability was to calculate the inlet piping pressure drop consisting of a frictional component and acoustic wave component evaluated under steam flow conditions, and then compare to the pressure drops of the EPRI tested safety valves.

(f) Provide a copy of the Seismic Qualification Report that contains the structural similarity analysis and operability analysis.

For (a)-(e) either cite EPRI test data or provide other test data (i.e., copy of the Dresser engineering evaluation on the safety valves) supporting the discussions.

5. The submittal identifies the Yankee PORV as a Dresser 2-1/2 - 31533 VX. The PORV tested by EPRI was a Dresser Model 31533VX-30-2 with a bore diameter of 1 5/16 in. Discuss the differences between the two valves, also provide the bore diameter for the Yankee PORV. If the plant PORV design and bore diameter are different from the tested PORV bore diameter, discuss the effect on performance due to the different design features and bore diameter and how the EPRI data can be interpolated to verify PORV operability.

6. Dresser Industries transmitted a letter in March 1976 to Metropolitan Edison Co. warning that the PORV block valve should be kept closed when the reactor coolant system pressure is below 1000 psig to avoid damaging the PORV (Model 31533VX-30-1) disk and seat by steam cutting. The EPRI program data indicates that the Dresser PORV was successfully tested on water at pressures in the 500-900 psig range. Steam testing at lower pressures was not performed. The recommendation made by Dresser that the PORV be isolated at pressures lower than 1000 psi would seem to preclude the use of the PORV for low temperature overpressure protection of the reactor vessel. Provide additional information concerning the Dresser recommendation as it applies to Yankee. Explain whether e Dresser recommendation or a modification it will be followed, or a modification to the PORV will be performed to prevent damage to the disk and seat, or provide additional test detail performed since March 1976 that demonstrates such precautions are unnecessary.

7. In valve operability discussions on cold overpressurization transients, the submittal only identifies conditions for water discharge transients. Although Yankee was not a participant in the EPRI test program, the valve inlet fluid conditions report for Westinghouse designed plants prepared by Westinghouse for EPRI stated

that the PORVs are expected to operate over a range of steam, steam-water and water conditions because of the potential presence of a steam bubble in the pressurizer and water solid operations. To assure that the PORVs operate for all cold overpressure events, discuss the range of fluid conditions expected for the expected types of fluid discharge and identify the test data that demonstrates operability for these cases. Since no low pressure steam tests were performed on the PORVs, confirm that the high pressure steam tests demonstrate operability for the low pressure steam case for both opening and closing of the PORV.

8. NUREG-0737 Item II.D.1 requires that the plant specific PORV control circuitry be qualified for design-basis transients and accidents. Provide information which demonstrates that this requirement has been fulfilled.

9. The PORV block valves tested at the Marshall steam station were tested only in horizontal piping runs with the PORV block valve stems in the vertical upright position. The mounting configuration of the Yankee PORV block valve is vertical. Discuss the effects of the vertical installed block valve configuration on valve operability and reliability.

10. The Yankee plant PORV block valve and actuator were not tested by EPRI. The Yankee submittal has stated that the plant specific PORV block valve, a 2 in. Pacific electric motor actuated gate valve, was similar to the Velan valves tested by EPRI. Other valve manufacturers were also represented. Provide additional discussion and detail on how the plant specific block valve was determined to be similar to the Velan block valves. Also provide a discussion and detail that demonstrates applicability of the Limitorque SMA-00-10 actuator to the EPRI tested actuators SMB-00-15 and SMB-000-10. Discuss how the EPRI PORV block valve tests results were extrapolated to demonstrate Yankee PORV block valve operability over the range of expected operating and accident conditions, and how the

requirements of NUREG-0737 Item II.D.1 have been met. Provide a copy of the valve manufacturers report on the review of the actuator torque requirements.

11. Bending moments are induced on the safety and PORVs during the time they are required to operate because of discharge loads and thermal expansion of the pressurizer tank and inlet piping. Discuss the predicted plant moments and demonstrate that the operability of the valves will not be impaired.

QUESTIONS RELATED TO THE THERMAL HYDRAULIC ANALYSIS OF THE INLET AND DISCHARGE PIPING

12. The submittal states that a thermal hydraulic analysis of the safety/relief valve piping system has been conducted, but does not present details of the analysis. To allow for a complete evaluation of the methods used and the results obtained from the thermal hydraulic analysis, provide a discussion on the thermal hydraulic analysis that contain at least the following information:

    (a) Evidence that the analysis was performed on the fluid transient cases producing the maximum loading on the safety/PORV piping system. The cases should bound all steam, steam to water, and water flow transient conditions for the safety and PORV valves.

    (b) A detailed description of the methods used to perform this analysis. This includes a description of methods used to generate fluid pressures and momenta over time and methods used to calculate resulting fluid forces on the system. Identify the programs used for the analysis and how these programs were verified.

    (c) Identification of important parameters used in the thermal hydraulic analysis and rationale for their selection. These include time step, valve flow area, peak pressure and pressurization rate, node spacing, choked flow junctions, valve opening time, the fluid conditions at valve opening.

    (d) An explanation of the method used to treat valve resistances in the analysis. Report the valve flow rates that correspond to the resistances used. Because the ASME Code requires derating of the safety valvesto 90% of actual flow capacity, the safety valve analysis should be based on flows equal to 111% of valve flow rating, unless another flow rate can be justified. Provide

information explaining how derating of the safety valves was handled and describe methods used to establish flow rates for the safety valves and PORVs in the analysis.

(e) A discussion of the sequence of opening of the safety valves that was used to produce worst case loading conditions.

(f) A sketch of the thermal hydraulic model showing the size and number of fluid control volumes.

Provide a copy of the contractor's piping thermal-hydraulic analysis report.

QUESTIONS RELATED TO THE STRUCTURAL ANALYSIS OF THE INLET AND DISCHARGE PIPING

13. The submittal states that a structural analysis of the safety/PORV valve piping system has been conducted, but does not present details of the analysis. To allow for a complete evaluation of the methods used and results obtained from the structural analysis, please provide reports containing at least the following information:

    (a) A detailed description of the methods used to perform the analysis. Identify the programs used for the analysis and how these programs were verified.

    (b) A description of the method used to apply the fluid forces to the structural model. Since the forces acting on a typical pipe segment are composed of a net, or "wave," force and opposing "blowdown" forces, describe the methods for handling both types of forces.

    (c) Identification of important parameters used in the structural analysis and rationale for their selection. These include lumped mass spacing, time step in the applied fluid forces, solution time step, damping and cut off frequencies (if applied).

    (d) A description of methods used to model supports, the pressurizer and relief tank connections, and the safety valve bonnet assemblies and PORV actuator.

    (e) An identification of the load combinations performed in the analysis together with the allowable stress limits. Differentiate between load combinations used in the piping upstream and downstream of the valve. Explain the mathematical methods used to perform the load combinations, and identify the governing codes and standards used to determine piping and support adequacy.

(f) An evaluation of the results of the structural analysis, including identification of overstressed locations and a description of modifications if any.

(g) A sketch of the structural model showing lumped mass locations, pipe sizes, and application points of fluid forces.

Provide a copy of the contractor's piping structural analysis report.