Docket Nos.: 50-445
and 50-446

JUL 05 1985

Mr. M. D. Spence
President
Texas Utilities Generating Company
400 N. Olive St., L. B. 81
Dallas, Texas 75201

Dear Mr. Spence:

Subject: NUREG-0737, Item II.D.1 - Performance Testing of Relief and Safety Valves, Comanche Peak Unit 1

References: (1) Letter from H. Schmidt to S. Burwell dated dated March 31, 1982
(2) Comanche Peak FSAR Amendment 40 dated May 10, 1983

Enclosed herewith are questions which have developed as a result of the EG&G Idaho review for the Mechanical Engineering Branch of the Comanche Peak 1 submittals for TMI Item II.D.1 of NUREG-0737, Performance Testing of Relief and Safety Valves. Please advise Mr. S. B. Burwell, of my staff, of your schedule for responding to these questions.

Should you have questions concerning this request for additional information, Mr. Burwell will arrange conference calls with the staff reviewers and staff consultants as necessary.

Sincerely,

ORIGINAL SIGNED BY:

Vincent S. Noonan, Director
for Comanche Peak Project
Division of Licensing

Enclosure: As stated

cc: See next page

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Comanche Peak Steam Electric Station
Units 1 and 2

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ENCLOSURE

REQUEST FOR ADDITIONAL INFORMATION

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

FOR

COMANCHE PEAK, UNIT 1

DOCKET NO.: 50-445

JUNE 1985

SAFETY EVALUATION QUESTIONS TMI ACTION NUREG-0737 II.D.1
FOR COMANCHE PEAK 1

Questions related to selection of transients and inlet fluid conditions:

1. The submittal identifies a steam discharge flow condition as a limiting event for the safety valves at this plant (loss of load for maximum pressurizer pressure and locking rotor for maximum pressurization rate). The submittal does not discuss whether single failures that could occur after the initiating event that would result in the dynamic forces on the safety relief valves being maximized were considered. Present a discussion that shows how single failures that would result in maximum dynamic forces on the safety relief valves were considered in selecting the limiting transient.

2. In the PORV operability discussions on low temperature overpressure transients, variable fluid conditions (steam or water) and temperatures (saturated to subcooled) were identified. To assure that the relief valves operate under all cold overpressurization events, include the nitrogen bubble case in the discussion. Also, identify the test data that demonstrate operability over the entire range of conditions. Confirm that the high pressure steam tests demonstrate valve operability for the low pressure steam case for both opening and closing of the relief valve. In addition indicate the set pressure of the PORV for cold overpressure protection.

3. The EPRI/Marshall block valve tests were performed with the valves in a horizontal position (valve stems vertical). Identify the orientation of the Comanche Peak-1 block valves. If they are oriented in any direction other than horizontal, provide detailed information on how the EPRI data was extrapolated to assure operability of the block valve in the plant specific orientation.

4. The submittal referenced EPRI Safety Valve Test Nos. (929, 931a, 932, 1406, 1411, 1415 and 1419) as being suitable for evaluating the operability of the

Comanche Peak-1 valves. The EPRI test blowdowns exceeded the 5% value given in the valve specifications. These increased blowdowns occurred with typical plant ring settings (-71 or -77, -18 relative to the bottom of the ring disk) that are much different from the ring settings specified in the submittal (i.e., -250, -18 relative to the level position). Based on a review of the EPRI test results, the Comanche Peak ring settings will produce larger blowdowns (i.e., greater than 10%). The higher blowdowns could cause a rise in pressurizer water level such that water may reach the safety valve inlet line and result in a steam-water flow situation. Also the pressure might be sufficiently decreased that adequate cooling might not be achieved for decay heat removal. Discuss these consequences of higher blowdowns if increased blowdowns are expected. In order that the suitability of Comanche Peak 1 safety valve ring setting may be evaluated, provide the factory ring settings relative to the bottom of the ring disk or relative to the upper limit of ring travel.

Questions related to valve operability:

5. The submittal does not address the expected blowdown and corresponding valve performance for the Comanche Peak 1 Crosby 6M6 safety valves at the plant ring settings. The submittal states that the ring setting for the safety valves are -250, -18 relative to the level position. The submittal states that the comparable EPRI tests were Test Nos. 929, 431a, 932, 1406, 1411, 1415 and 1419. The ring settings for these tests were -77 or -71, -18 relative to the bottom of the ring disk. Explain how the expected values for backpressure and blowdown corresponding to the Comanche Peak 1 ring settings were extrapolated or calculated from test data with such different ring settings, and identify the values for backpressure and blowdown so determined.

6. Thermal expansion of the pressurizer and piping will induce loads on the safety and relief valve piping and on the pressurizer nozzles. This thermal expansion would also induce loading on the inlet flange of a safety or relief valve at the time the valve is required to lift. Evaluate the effects that this loading may have on valve operability.

7. The EPRI guide for application of test results to plant specific evaluations suggests that the inlet piping pressure drops for the Crosby 6M6 EPRI test valves be compared to the calculated Comanche Peak-1 Crosby 6M6 inlet piping pressure drop as a means of assessing valve stability. Provide the pressure drop calculations and the assessment of valve stability. If alternate pressure drop calculations were performed, provide a detailed explanation, and a detailed valve stability assessment.

Questions related to thermal hydraulic analysis:

8. The adequacy of the thermal hydraulic analysis could not be verified since it is not presented in the submittal. Provide detailed information on the program used so that the methodology for generating fluid parameters can be evaluated. Identify parameters such as timestep, valve flow area, pressure ramp rate, choked flow junction, and node spacing and discuss the rationale for their selection. Provide detailed information on how the program or methodology was verified for this application.

9. Discuss whether multiple valve actuations were considered in the thermal hydraulic analysis. The maximum loading on the piping typically occurs under a multiple valve actuation condition during which the valves open in sequence. The experience of EG&G Idaho indicates that the maximum loading occurs when the sequence of opening is such that the initial pressure waves from opening of the safety valves reach the common header downstream simultaneously. Additionally, if a PORV is discharging with flow in the common header, the piping loads could be significantly affected. Provide justification that sequential opening of the valves under multiple valve actuation conditions was considered.

10. Identify the program or methodology for calculating the fluid forces for the structural analysis. Discuss the accuracy of the results and the procedures used to qualify the program or methodology.

11. Identify the initial conditions for the safety and relief valve thermal-hydraulic analyses. Describe the method used for treating valve resistance in the analyses and report flow rates corresponding to the resistances used. Because the ASME Code requires derating of the safety valves to 90% of actual flow capacity, the safety valve analysis should be based on a flow rating equal to 111% of the flow rate stamped on the valve, unless another flow rate can be justified. Provide further information explaining how derating of the safety valves was handled and describing methods used to establish flow rates for the safety valves and PORVs in the thermal hydraulic analyses.

Questions related to structural analysis:

12. The submittal does not present details of the structural 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 computer 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) A description of methods used to model supports, the pressurizer and relief tank connections, and the safety valve bonnet assemblies and PORV actuator.

   (d) 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.

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

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

(g) A copy of the structural analysis report.

13. According to results of EPRI tests, high frequency pressure oscillations of 170-260 Hz typically occur in the piping upstream of the safety valve while loop seal water passes through the valve. An evaluation of this phenomena is documented in the Westinghouse report WCAP 10105 and states that the acoustic pressures occurring prior to and during safety valve discharge are below the maximum permissible pressure. The study discussed in the Westinghouse report determined the maximum permissible pressure for the inlet piping and established the maximum allowable bending moments for Level C Service Condition in the inlet piping based on the maximum transient pressure measured or calculated. While the internal pressures are lower than the maximum permissible pressure, the pressure oscillations could potentially excite high frequency vibration modes in the piping, creating bending moments in the inlet piping that should be combined with moments from other appropriate mechanical loads. Provide one of the following:
(a) a comparison of the expected peak pressures and bending moments with the allowable values reported in the WCAP report or
(b) justification for other alternate allowable pressure and bending moments with a similar comparison with peak pressures and moments induced in the plant piping.

Question related to PORV control circuitry:

14. 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.