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TU ELECTRIC

November 13, 1992

William J. Cahill, Jr.
Group Vice President

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES) - UNIT 2
DOCKET NO. 50-446
ADDITIONAL INFORMATION CONCERNING
NUREG-0737, ITEM II.D.1 - PERFORMANCE TESTING
OF RELIEF AND SAFETY VALVES

REF: TU Electric letter logged TXX-92246 from
Mr. William J. Cahill, Jr. to USNRC dated May 18, 1992

Gentlemen:

The above referenced letter provides the Comanche Peak Steam Electric Station, Unit 2 pressurizer safety and relief line thermal hydraulic analysis (NUREG-0737, Item II.D.1). The NRC staff reviewed this analysis and requested that additional information be provided. Attached is the requested additional information.

If there are any questions, please contact Mr. Manu C. Patel at (214) 812-8298.

Sincerely,

William J. Cahill, Jr.

By: J S Marshall
J. S. Marshall
Generic Licensing Manager

MCP/ds
Attachment

c - Mr. J. L. Milhoan, Region IV
Resident Inspectors, CPSES (2)
Mr. B. E. Holian, NRR

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(1) Backpressure

The submittal in Reference 2 did not provide the maximum backpressure calculated for Comanche Peak, Unit 2. Review of the Comanche Peak, Unit 2, Final Safety Analysis Report (FSAR), Table 5.4-16, Amendment 14, 1981, provided a backpressure of 500 psig for a safety valve discharge. Because this information is over 10 years old, clarify if this value accurately represents the currently calculated, maximum backpressure. If not, provide the new value. If the maximum plant backpressure for the safety valves exceeds the tested backpressure, justify the applicability of the EPRI tests to the Comanche Peak, Unit 2, valve configuration.

CPSES Response

500 psig backpressure is conservative for Unit 1 and Unit 2. Stone & Webster documented the backpressure calculation in MECB 380 and 2-ME-0068 for Unit 1 and Unit 2, respectively. The calculated backpressure was less than 500 psig.

(2) Applicability of Valve Inlet Conditions

Reference 4, the Westinghouse valve inlet conditions report, is now more than 10 years old, and some of the information in the report is based on even older analyses. For example, the feedwater line break valve inlet conditions given in Reference 4 for Comanche Peak, Unit 2, were based on a 1976 FSAR analysis. Clarify if the valve inlet conditions in Reference 4 are still applicable to Comanche Peak, Unit 2, for FSAR steam discharge, FSAR liquid discharge, extended high pressure injection, and cold overpressure protection transients. If not, provide updated valve inlet conditions for Comanche Peak, Unit 2, and identify the applicable EPRI tests for the new valve inlet conditions. If none of the EPRI tests are applicable to the new inlet conditions or the EPRI tests applicable to the new inlet conditions indicate potential valve operability problems (chatter, test valve did not close, etc.) for the safety valves or PORVs, provide information and test data to justify valve operability for the new valve inlet conditions.

CPSES Response

The valve inlet condition for FSAR steam discharge, FSAR liquid discharge, extended high pressure injection, and cold overpressure protection transients described in EPRI-NP-2296 (December 1982) are applicable to CPSES Unit 2.

(3) Safety Valve Inlet Fluid Temperature

The submittal indicated the safety valve loop seal was insulated to provide a loop seal water temperature of 300°F at the valve inlet. Has Texas Utilities Electric Company (TUEC) verified by field measurement the actual loop seal temperature? If yes, provide the measured temperature to verify the actual temperature is consistent with the assumed temperature. If not, verify the loop seal temperature and compare it to the assumed value. If the measured temperatures is lowered than the assumed temperature, discuss the effect of the lower temperature on valve operability and reanalyze the safety value discharge case with the lower temperature.

CPSES Response

TU Electric has verified by field measurement the loop seal temperature in CPSES Unit 1 as 314 degrees F. The insulation design for the Unit 2 loop seal is the same as for Unit 1.

(4) Bending Moments

The information in Reference 2 provided the maximum bending moment calculated to occur on the valve inlet flanges of the safety valves and PORVs at Comanche Peak, Unit 2. According to the EPRI test reports, however, the test bending moment for the safety valves was measured at the valve discharge. It is not clear from the EPRI test reports where the test bending moment was measured for the PORVs. Therefore, to ensure bounding the EPRI test results, provide the maximum expected bending moment at the valve discharge for the Comanche Peak, Unit 2, safety valves and PORVs. The calculated worst case should include the effects of deadweight, thermal expansion, earthquake (SSE), and valve actuation loads. If the new values exceed those applied to the test valves, justify that the plant valves will operate satisfactorily with the higher bending moment.

CPSES Response

The Comanche Peak Unit 2 safety valve inlet moment of 172.428 in-kips is an enveloping nozzle load value considering both the inlet and outlet nozzles of all three safety valves. The Comanche Peak Unit 2 PORV valve inlet moment of 21.625 in-kips is an enveloping load value considering both the inlet and outlet nozzles of both PORVs.

(5) Block Valve Motor Operator Torque

According to the information available to the NRC, the PORV block valves at Comanche Peak, Unit 2, are Westinghouse 3GM88 valves with Limitorque SB-00-15 operators. Verify if this is true. In the EPRI tests, the Westinghouse 3GM88 opened and closed completely with a motor operator torque output of 182 ft-lbs. Westinghouse recommended the block valve operators be modified from torque control closure to limit control closure to ensure complete closure. To ensure that the plant block valve operators provide sufficient torque to open and close the valves at Comanche Peak, Unit 2, clarify whether TUEC made this modification to the plant block valves. Also, clarify whether the torque supplied by the plant motor operators is greater than or equal to 182 ft-lbs when using the limit control method. If the plant operator torque output is less than 182 ft-lbs, justify that they provide sufficient torque to close the valves under all expected inlet fluid conditions. This justification should be supported by test data.

CPSES Response

The PORV block valves are W 3GM88 with Limitorque SB-00-15 operators. These valve operators were modified to limit control closure for Unit 2. Maximum required closing torque was determined to be 152 ft-lbs equivalent to a maximum required closing thrust of 13158 pounds. The operability of the valve in closing is based on 80% voltage stall thrust being greater than 13158 pounds. Stall thrust for the valves at 80% voltage is 18045 lbs. [80% voltage stall closing torque exceeds 182 ft-lbs.].

(6) Extended Safety Valve Blowdown

The safety valve blowdown in the applicable EPRI tests ranged from 4.8% to 12.7%. This indicates operation of the plant safety valves may result in blowdowns that exceed the design safety valve blowdown of 5%. Provide sufficient information to show: (a) the extended safety valve blowdown will not cause voiding of the primary system or degrade decay heat removal if voiding occurs, (b) the safety valves will operate acceptably if the extended safety valve blowdown results in filling the pressurizer, and (c) the extended safety valve blowdown will not challenge plant safety systems.

CPSES Response

CPSES is currently reviewing the extended safety valve blowdown and its impact on plant safety systems.

(7) <u>PORV Control Circuitry</u>

As noted in the introduction, NUREG-0737, Item II.D.1, requires qualification of the PORV control circuitry.

A) An environmental qualification, the NRC staff agreed that meeting the licensing requirements of 10 CFR 50.49 for this circuitry is satisfactory and specific testing per NUREG-0737 is not required. From the information provided in Reference 2, it would appear the Comanche Peak, Unit 2, PORV control circuitry is included in TUEC's 10 CFR 50.49 program; however, TUEC never stated this. Therefore, clarify if the PORV control circuitry was reviewed and accepted in the 10 CFR 50.49 program for Comanche Peak, Unit 2. If the PORV circuitry was not qualified to the requirements of 10 CFR 50.49, provide information to demonstrate that the control circuitry is qualified per the guidance provided in Reg. Guide 1.89, Revision 1, Appendix E.

B) Clarify how the PORV control circuitry is qualified for normal operation. That is, clarify what tests TUEC performs to ensure the PORV control circuits will respond properly to operator actions in normal operation or emergency situations or automatic signals in emergency situations. How the operability of the PORV's is assured?

<u>CPSES Response</u>

A) The PORV control circuitry, including pressure sensors was reviewed and accepted in the 10 CFR 50.49 program for CPSES Unit 2.

B) These issues were addressed by Generic Letter 90-06. TU Electric has responded to Generic Letter 90-06 in TXX-901053, dated December 21, 1990, as supplemented by TXX-92255, dated May 27, 1992. This generic letter was closed by the NRC in SSER 25.

(8) <u>The following information is needed to complete the review of the Comanche Peak, Unit 2, thermal-hydraulic analysis</u>:

A) Identify the valve opening/closing times used in the thermal-hydraulic analysis. Compare the time used to the open/closing times measured in the EPRI tests. If the times used in the thermal-hydraulic analysis are greater than the measured valve open/closing times, justify that piping forces were not underestimated.

B) Justify that the valve discharge cases analyzed result in forces that bound the forces from all transient conditions expected at Comanche Peak, Unit 2. While it is clear the safety valve and PORV loop seal discharge cases would bound most situations, it is not clear this includes steam-to-water transition with hot water (such as the feedwater line break), steam-to-water transition with cold water (such as a cold overpressure transient), and hot and cold water discharge only transients.

C) The peak pressure in the PORV discharge case was 2350 psia. This is lower than the peak pressure calculated by Westinghouse, 2532 psia, for PORV discharge at Comanche Peak, Unit 2. Justify that the thermal-hydraulic analysis did not underestimate piping forces during a PORV discharge due to the lower pressure used or provide the results of a new analysis using the higher pressure.

CPSES Response

A) The valve opening times used in the Safety and Relief valve thermal-hydraulic blowdown analyses are 0.040 and 1.000 seconds, respectively. Westinghouse computer codes and methods used to perform these blowdown analyses were established based on analytical benchmarking of the EPRI test configuration. This test configuration was analyzed using the above opening times and the results were found to be equal to or greater than the actual EPRI test results.

B) Interviews with the current and previous Westinghouse personnel who perform these analyses indicates that there has been plant specific investigation into the severity of Pressurizer Safety and Relief Valve (PSARV) discharge cases other than the "loop seal slug" discharge case. The result of the other discharge cases have been found to be less severe than the "loop seal slug" discharge.

C) The thermal-hydraulic blowdown event takes place when the PORVs open at 2350 psi. Under certain conditions such as "loss of load", the pressurizer pressure will continue to rise, in this example to 2532 psi, at a maximum rate of 130 psi/sec. Since the "slug" clears the line in approximately 1.7 seconds there will be some increase in the pressurizer driving pressure during the transient event. Since the maximum pressure is less than 10% above the valve opening pressure, and since the critical loadings on the valves and pressurizer nozzle peak within 0.5 seconds, the transient increase in the system pressure is not considered significant and is not included in the Westinghouse analysis.

(9) Additional information on the structural analysis is needed. Please provide the following information:

A) Identify the time step, the mass point spacing, damping factors, and the cutoff frequency used in the analysis model for various pipe sizes. Give the rationale for the values chosen for the above parameters. Justify they provide bounding analyses for the Comanche Peak, Unit 2, pressurizer piping system. The values chosen for the above parameters should adequately analyze the piping system response to frequencies of at least 100 Hz. For example, the time steps chosen should be approximately 0.001 s to allow a minimum of eight points per cycle to define the forces applied to the piping. If the values of the parameters chosen do not adequately address frequencies of at least 100 Hz, provide sufficient information to justify that the structural analysis accounts for the dominant piping frequencies at Comanche Peak, Unit 2.

B) Compare the stresses and loads calculated for the pressurizer nozzles for the safety valves and PORVs to the allowable stresses and loads. If the calculated stresses and loads exceed the allowable values, discuss the modifications TUEC will make to bring the system into compliance.

CPSES Response

A) The time step, mass point spacing, damping factors, and cutoff frequency used for the unit 2 PSARV analyses are the same as the Unit 1 analyses previously reviewed by the NRC. The time step is 0.001 sec, the damping used is 2%, and the cutoff frequency used is 1000 Hz.

B) Qualification of all components of the PSARV system is a requirement of the Class 1 piping, additionally qualification of nozzle loads for valves and equipment is a checklist item in the stress report. The Comanche Peak Unit 2 stress report format also provides a reference for the additional efforts required to qualify nozzle loads if the Comanche Peak Unit 2 loads exceed the published allowable values. The stress report for the PSARV system is available for review.

(10) <u>Reference 2, TUEC stated, "The hydraulic forcing function input used for Unit 1 was also used for Unit 2</u>

In Reference 2, TUEC stated, "The hydraulic forcing function input used for Unit 1 was also used for Unit 2. The piping system layouts, geometrics, and components are nearly identical in Units 1 and 2 with only small differences in the support system configuration." Clarify this statement by identifying all the differences between the Unit 1 and 2 piping and support systems. Given the identified differences in the Unit 1 and 2 piping and support systems, provide sufficient information to justify that applying the Unit 1 hydraulic forcing functions to Unit 2 will not result in underestimating the piping forces for Unit 2.

<u>CPSES Response</u>

The only practical way to "identify all the differences between the Unit 1 and Unit 2 piping and support systems" is to obtain the piping isometrics and the support location drawings for both Units 1 and 2 and make the comparison according to the relevant criteria. Westinghouse has made this comparison and found that the Unit 2 piping geometry is a "mirror image" of the Unit 1 geometry, within acceptable NCIG-05 tolerances and therefore the Unit 2 hydraulic forcing functions were created by reflecting the Unit 1 hydraulic forcing functions. This forcing function was then applied to the Unit 2 specific structural model (Unit 2 geometry, support locations and stiffness).

REFERENCES

1. Letter from H. C. Schmidt, Texas Utilities Services, Inc., to S. B. Burwell, NRC, Subject: "Comanche Peak Steam Electric Station, Draft Response to Generic Letter No. 81-36, "Log No. TXX-3503, File No. 10035, March 31, 1982.

2. Letter from W. J. Cahill, TUEC, to USNRC Document Control Desk, Subject: "Comanche Peak Steam Electric Station (CPSES) - Unit 2, Docket No. 50-446, NUREG-0737, Item II.D.1 - Performance Testing of Relief and Safety Valves," Log No. TXX-92246, File No. 10010, May 18, 1992.

3. MPR Associates, Inc., EPRI PWR Safety and Relief Valve Test Program, Guide for Application of Valve Test Program Results to Plant-Specific Evaluations, Revision 2, Interim Report, July 1982.

4. Westinghouse Electric Company, Valve Inlet Fluid Conditions for Pressurizer Safety and Relief Valves in Westinghouse-Designed Plants, EPRI-NP-2296, December 1982.