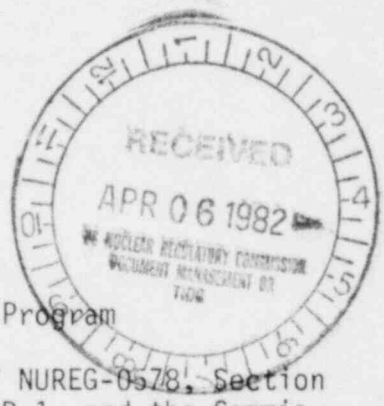
Omaha Public Power District

1623 HARNEY ■ OMAHA, NEBRASKA 68102 ■ TELEPHONE 536-4000 AREA CODE 402

April 1, 1982
LIC-82-138

Mr. Robert A. Clark, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactors Branch No. 3
Washington, D.C. 20555



Reference: Docket No. 50-285

Dear Mr. Clark:

Subject: Safety and Relief Valve Test Program

In accordance with the initial recommendations of NUREG-0578, Section 2.1.2, as later clarified by NUREG-0737, Item II.D.1, and the Commission's letter dated September 29, 1981, each pressurized water reactor (PWR) utility on or before April 1, 1982 was to submit a preliminary evaluation supported by test results which demonstrates the capability of relief and safety valves to operate under expected operating and accident conditions.

This letter provides the results of Omaha Public Power District's preliminary assessment of the relief and safety valve test program as it applies to the Fort Calhoun Station.

The District is a participant in the Generic PWR Safety and Relief Valve Test Program implemented by the Electric Power Research Institute (EPRI) at the request of participating PWR utilities in response to the U. S. Nuclear Regulatory Commission recommendations for safety and relief valve testing. The primary objective of the test program was to provide full scale test data confirming the functionability of primary system power operated relief valves and safety valves for expected operating and accident conditions. The second objective of the program was to obtain sufficient piping thermal hydraulic load data to permit confirmation of models which may be utilized for plant unique analysis of safety and relief valve discharge piping systems. Relief valve tests were completed in August 1981 and safety valve tests were completed in December 1981. The reports prepared by EPRI documenting the test program results and a summary justification for applicability to the Fort Calhoun Station are listed below.

A046
S
1/1

A. "Valve Selection/Justification Report"

This report documents that the selected test valves represent all participating PWR plant safety and relief valves. The Fort Calhoun Station's pressurizer overpressure protection system consists of two Crosby 3K6 safety valves and two Dresser 31533VX-30 power operated relief valves, operating in parallel. EPRI tested valves made by the same manufacturers and of the same models; therefore, the valves tested are representative of the Fort Calhoun Station valves.

B. "Test Condition Justification Report" and the "Combustion Engineering Plant Condition Justification Report"

These reports document the basis and justification of the valve test conditions for all participating PWR plants. The fluid inlet conditions for the Fort Calhoun Station's pressurizer safety and relief valves are identified in our NSSS vendor's report (Combustion Engineering report prepared for EPRI, NP-Research Project V102-20 (Phase B), interim report dated March 1982). This report demonstrates that EPRI's test conditions are representative of all feasible conditions which could occur at the Fort Calhoun Station.

C. "Safety and Relief Valve Test Report"

This report provides evidence demonstrating the functionability of the selected test valves under the selected test conditions for all participating PWR plants. The test data, presented by EPRI, encompasses the Fort Calhoun Station's valves and valve inlet conditions to the extent that a realistic estimate of actual valve performance during plausible operating excursions can be determined. The District expects to provide additional data available, by July 1, 1982, which will assess valve performance modifications if necessary.

D. "Applicability of RELAP5/MOD1 for Calculation of Safety and Relief Valve Discharge Piping Hydrodynamic Loads"

This report presents an analytical model benchmarked against test data that may be used for plant unique analysis of safety and relief valve discharge piping systems. The safety valve and power operated relief valve system discharge piping at the Fort Calhoun Station was previously analyzed for transient and steady state loads under the action of subcooled liquid flow for low temperature overpressurization (LTOP) events with loop seal water followed by steam flow. This analysis was performed as a result of concerns for protecting against LTOP by providing a low pressure setpoint on the power operated relief valves. Piping modifications were performed to ensure that the integrity of the piping would be maintained consistent with applicable codes. Certain EPRI test data indicate that our previous analysis and results may not be sufficiently conservative; therefore, the District will perform a detailed thermal hydraulic analysis, using a code comparable to RELAP 5 to verify the adequacy of the existing discharge piping.

This analysis will be performed after completing the valve test data evaluation which provides the input to the analysis. However, the modification previously performed provides reasonable assurance that the piping system would perform adequately during any of the feasible events.

All of the documents have been received by the District and transmitted to you by David Hoffman of Consumers Power Company on behalf of the participating PWR utilities as part of our response in meeting the April 1, 1982 preliminary submittal requirement. Enclosure 1 provides additional information related to the design and bases for the Fort Calhoun Station safety valves and power operated relief valves.

In addition to providing the referenced reports, the District has performed a preliminary review of the test program results. Based on the review, we have concluded that valves tested represent the safety and relief valve designs and that the conditions tested envelop the range of expected operating and accident conditions for the Fort Calhoun Station. The above mentioned reports also provide the evidence required by NUREG-0737, Item II.D.1.A which will be used to perform the final plant specific evaluations.

The September 29, 1981 Commission letter requested that plant specific final evaluations be submitted by July 1, 1982. In order to meet that date, evaluations have been initiated. Depending on the outcome of the evaluations, it may be necessary to continue the evaluation beyond July 1, 1982. If a longer evaluation period is required, you will be notified on or before July 1, 1982.

Sincerely,

W. C. Jones
Division Manager
Production Operations

Enclosure

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20036

ENCLOSURE 1

Design Bases

The maximum pressure transient for the reactor coolant system pressure vessel allowed under ASME Code, Section III, is 110% of design pressure. The maximum pressure transient allowable in the reactor coolant system piping, valves, and fittings under USAS Section B 31.1 is 120% of design pressure. The established design pressure at the Fort Calhoun Station's reactor coolant system is 2500 psia; therefore, the safety limit for the reactor coolant system is 2750 psia and for piping, valves, and fittings it is 3000 psia.

To protect against anticipated pressure transients, two spring loaded safety valves are installed on the Fort Calhoun Station pressurizer. These valves meet ASME Code requirements and are designed to pass sufficient pressurizer steam to limit the reactor coolant system pressure to 110% of design following a complete loss of load without simultaneous reactor trip while operating at 1500 MWT. If during this event no residual heat were removed by any of the other means available, the amount of steam which could be generated at safety valve lift pressure would be less than half the capacity of one safety valve.

To enhance the operation of the plant and to minimize the operation of the safety valves, two power operated relief valves (PORV's) were installed at the Fort Calhoun Station. The PORV's are critical quality equipment (CQE) but are not needed to achieve safe shutdown. The PORV's are half capacity valves, but their total capacity is sufficient to limit the reactor coolant system pressure to 110% of design for the design basis overpressure event. They are also used to protect the reactor coolant system from low temperature overpressure.

The hydraulic and mechanical properties of the safety and power operated relief valves for the Fort Calhoun Station are listed below.

1. Safety Valves (RC-141 and RC-142)

   The valve inlets are provided with uninsulated loop seals which contain approximately five gallons (each) of water at an estimated temperature of 160°F during normal power operation. The parameters for these valves are given in Table 1.

Table 1
Pressurizer Safety Valve Parameters

Manufacturer:	Crosby
Number:	Two
Type:	Safety, balanced bellows-enclosed bonnet, ASME Code
Design Pressure:	2500 psia
Design Temperature:	700°F
Normal Operating Pressure:	2100 psia
Normal Operating Temperature:	643°F
Fluid:	Saturated steam
Capacity Per Valve (Minimum):	200,000 lbm/hr
Total Capacity (Minimum):	400,000 lbm/hr

Capacity Per Valve (Maximum):	240,000 lbm/hr
Total Capacity (Maximum):	480,000 lbm/hr
Set Pressure - RC-141:	2530 psig
Set Pressure - RC-142:	2485 psig
Back Pressure - Superimposed:	3 to 300 psig range
Back Pressure - Built-Up:	500 psig
Accumulation:	Maximum 3% of set pressure
Blowdown:	4% of set pressure
Orifice Area (in^2):	1.8904
Body Material:	ASTM-216 Grade UCB or equal
Trim Material:	Stainless steel
Spring Material:	Alloy steel

Connections:	Inlet	Outlet
Type:	Flanged	Flanged
Size:	3 inch	6 inch
Rating:	2500 lb	300 lb

2. Power Operated Relief Valves (PCV-102-1 and PCV-102-2)

The valve inlets are provided with uninsulated loop seals which contain approximately 2.3 gallons (each) of water at an estimated temperature of 100°F to 120°F. A motor operated isolation valve (HCV-150, HCV-151) is provided upstream of each of the relief valves to permit isolating a valve in case of failure or excessive leakage. The parameters for these valves are given in Table 2.

Table 2
Pressurizer Power Operated Relief Valve Parameters

Manufacturer:	Dresser
Number:	Two
Type:	Power operated, internal solenoid pilot
Design Pressure:	2500 psia
Design Temperature:	700°F
Normal Operating Pressure:	2100 psia
Normal Operating Temperature:	643°F
Fluid:	Saturated steam
Capacity Per Valve (Minimum):	99,000 lbm/hr
Total Capacity (Minimum):	198,000 lbm/hr
Capacity Per Valve (Maximum):	117,000 lbm/hr
Total Capacity (Maximum):	234,000 lbm/hr
Set Pressure (Trip):	2400 psia, when temperatures are above 300°F
Low Temperature Overpressure (Trip):	450 psia, when temperatures are below 300°F
Back Pressure - Superimposed:	3 to 300 psig range
Orifice Area (in^2):	.94
Body Material:	A 182 Grade F 316
Trim Material:	Stainless steel

ENCLOSURE 1
(Continued)

Connections:	Inlet	Outlet
Type:	Flanged	Flanged
Size:	2½ inch	4 inch
Rating:	2500 lb	300 lb