



PSE&G

Public Service Electric and Gas Company 80 Park Plaza Newark, N.J. 07101 Phone 201/430-7000

June 30, 1982

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, MD 20014

Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch 1
Division of Licensing

Gentlemen:

RELIEF AND SAFETY VALVE TESTING
UNITS NO. 1 AND 2
SALEM NUCLEAR GENERATING STATION
DOCKET NOS. 50-272 AND 50-311

Paragraph 2.C.25(e) of Facility Operating License DPR-75 requires that PSE&G qualify the reactor coolant system relief, safety, and block valves under expected operating conditions for design basis transients and accident in accordance with the plant-specific requirements and schedules established in NUREG-0737. This NUREG 0737 requirement (Item II.D.1) also applies to Facility Operating License DPR-70.

On September 29, 1981, the NRC issued Generic Letter 81-36, which provided a revised schedule for this item, extending completion of the PWR test program until April 1, 1982 and of the PWR plant specific report until July 1, 1982. Necessary testing to demonstrate safety and relief valve function for expected operating and accident (non-ATWS) conditions was completed and the test reports, along with valve selection and test condition justification reports, were submitted to the NRC in our letter dated March 31, 1982.

The enclosure to this letter transmits to you our plant specific response on this matter, summarizing specifics on safety and relief valve performance and piping adequacy for both inlet and discharge piping, for Salem Units 1 and 2. It also addresses the Salem specifics in the area of block valve adequacy. However, as explained in the enclosure, portions of the plant specific report have not been finalized at this time. It is anticipated that this information will be completed and submitted to you in a final plant specific report by December 31, 1982.

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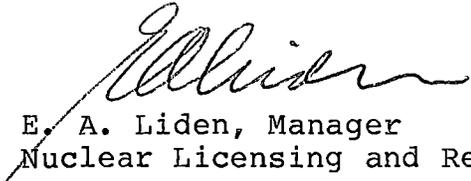
Director of
Nuclear Reactor Regulation

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Should you have any questions in this regard, do not
hesitate to contact us.

Very truly yours,



E. A. Liden, Manager
Nuclear Licensing and Regulation

FAM:li

Enclosure

CC: Mr. Leif Norrholm
NRC Senior Resident Inspector
Mr. William J. Ross
NRC Licensing Project Manager

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SALEM GENERATING STATION, UNITS 1 AND 2
PLANT SPECIFIC REPORT ON SAFETY AND RELIEF VALVE
TEST PROGRAM

1.0 VALVE OPERABILITY:

1.1 Power Operated Relief Valves:

Salem PORV's are 2" NPS Copes Vulcan valves with 17-4PH plug and cage. 3" Copes Vulcan valves similar to Salem valves (Ref. 3.1) were tested by EPRI in a test configuration similar to that of the configuration at the Salem plant.

The fluid condition for the PORV's addressed in the Salem FSAR were identified by Westinghouse (Ref. 3.2) and were the basis for the fluid conditions for test. Salem cold overpressurization conditions were reviewed by PSE&G and were found to be enveloped by EPRI test conditions.

Tests conducted on the valve have confirmed that the valve opened and closed on demand and that the valve suffered no damage that will preclude future operation. Specific information related to these tests is given in Section 4.7 of the Safety and Relief Valves Test Report (Ref. 3.4).

Although the tests indicated acceptable valve performance, test valve disassembly showed galling of the cage and plug guiding surfaces. In view of this observation, PSE&G has changed internals of Salem Unit 1 PORV's to include 316 stellited plug instead of 17-4PH [The test valves with this combination of internals had shown no indication of galling]. Similar modifications on Unit 2 will be made prior to startup following the first refueling outage.

1.2 Safety Valves:

Salem safety valves are 6M6 Crosby valves which were tested by EPRI in a test configuration similar to that of the actual pressurizer configuration at the Salem plant.

The fluid conditions for the tests enveloped fluid conditions identified by Westinghouse (Ref. 3.2). The safety valves have been shown to open and close. The functionability of the valves to provide overpressure protection for the pertinent events described in the FSAR was found to be adequate by Westinghouse (Ref. 3.5). However, depending upon the test conditions (steam - transition - water), the valves have been shown to flutter and/or chatter during loop seal discharge. The observed instability of the safety valves during loop seal discharge has been evaluated and preliminary indications show it not to be a safety concern.

Upstream piping and valve ring adjustments have been shown to have a substantial effect on valve performance and blowdown. Continuum Dynamics, Inc. has developed a valve dynamic model under EPRI contract which can estimate valve performance for steam conditions (a dynamic model for conditions other than steam is being developed by Continuum Dynamics, Inc.). Salem safety valve plant specific performance using the present model is being performed by Continuum Dynamics, Inc. Initial indications project that the valve performance will be stable under steam conditions and blowdown will be less than ten percent. However, evaluations are required from the valve manufacturer as well as additional evaluations by Continuum Dynamics and Westinghouse. In view of this, a final plant specific report on safety valve operability, which will identify any required modifications, will be submitted by December 31, 1982.

1.3 Block Valves:

Salem block valves are 3" Velan valves with SMB-00-15 motor operators which were tested by EPRI at the Marshall Facility. The Velan valve fully opened and closed on demand for each of the 21 cycles of evaluation test (Ref. 3.6). No operability concern has been identified.

2.0 PIPING ADEQUACY:

2.1 Inlet Piping:

During a portion of the tests performed on safety valves, it was noted that the pressure upstream of the valve tended to oscillate, especially for loop seal configurations. These oscillations are thought to be related to valve instability which, in turn, is related to valve and inlet piping parameters. The tests that exhibited pressure oscillations are summarized in Volume 10, Section 4 of the EPRI Safety and Relief Valve Test Report.

For the test configuration that most nearly approximates the Salem configurations, a maximum peak transient pressure of 6300 psi was experienced. We have performed a preliminary analysis of the expected behavior of Salem Units 1&2 safety valve inlet piping assuming unstable valve behavior. The analysis indicates that the peak transient pressure for Salem Unit 2 will be less than the test value (6300 psi) whereas the expected peak transient pressure for Salem Unit 1 will be below 7100 psi. The maximum permissible pressure for the inlet piping is calculated to be 7130 psi by Westinghouse. Hence, our review of inlet pressure oscillations indicate no safety concern. However, we are continuing to analyze and assess the implications of upstream pressure oscillations and will provide this information by December 31, 1982.

2.2 Discharge Piping:

PSE&G has retained EDS Nuclear Inc. to review discharge piping adequacy. EDS has reevaluated Salem plant specific piping against the original Westinghouse design criteria and the comparison shows that the load range predicted was significantly lower than that predicted by EPRI test data. EDS Nuclear has been developing a RELAP 5 MOD 1 thermal/hydraulic model of the safety and relief valve discharge piping. Once the RELAP model is completed, the code will be run and the data processed and input into a

structural code. If the results indicate that design limits on the S/RV piping has been exceeded, appropriate modifications will be made. The EDS effort is expected to be completed in October 1982. Discharge piping adequacy for Unit 2 is being evaluated inhouse but is not expected to be limiting. In view of this, the final evaluation of discharge piping adequacy will be provided by December 31, 1982. However, no safety concern is projected in the interim.

3.0 REFERENCES

- 3.1 Valve Selection/Justification Report
- 3.2 Test Condition Justification Report
- 3.3 Westinghouse Plant Condition Justification Report
- 3.4 Safety and Relief Valve Test Report
- 3.5 Safety Valve Operability Report Westinghouse WCAP 10105
- 3.6 EPRI PWR Safety and Relief Valve Test Program - PORV Block Valve Information Package
- 3.7 Application of RELAP 5/MOD 1 of Safety and Relief Valves Discharge Piping Hydrodynamic Loads

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SAFETY VALVE INFORMATION: (SALEM 1 and 2)

1. VALVE PARAMETERS:

Number of Valves : 3/unit
Manufacturer : Crosby Valve & Gage Co.
Type : Crosby HB-BP-86 6M6 Safety Valve (Loop Seal Internals)
Set Point : 2485 psig
Size : 6" Inlet x 6" Outlet
Orifice Size = 2.154"
(3.644 in²)
Rated Capacity (Steam) : 420,000 lb/hr each
Design Pressure & Temp.: 2485 psig & 680°F
Inlet Flange Rating : 1500 #ASA
Discharge Flange Rating: 600 #ASA

2. INLET PIPING PARAMETERS

Diameter : 6" Sch 160

	<u>Unit 1</u>	<u>Unit 2</u>
Length		
Loop 3	: 14.553'	12.054'
Loop 4	: 12.873'	12.241'
Loop 5	: 12.309'	11.719'

Type : Loop Seal

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POWER OPERATED RELIEF VALVE INFORMATION: (SALEM 1 and 2)

1. VALVE PARAMETERS

Number of Valves : 2/unit
Manufacturer : Copes-Vulcan Division
Type : Diaphragm Operated Relief Valve
Set Point : 2315 psig
Size : 2" Valve with 3" inlet and outlet BW connection
Orifice 2"
Rated Capacity (Steam) : 210,000 lb/hr at 2335 psig
Design Pressure & Temp.: 2485 psig & 680°F
Valve Rating : 1500 #ASA

2. INLET PIPING PARAMETERS:

Type : Loop Seal

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PS 05 02-A

BLOCK VALVE INFORMATION: (SALEM 1&2)

Number of Valves: 2/Unit
Valve Manufacturer: Velan Engineering Co.
Operator Manufacturer: Limitorque
Type: 3" Motor Operated Gate Valve
3GM58FN with BW ends and SMB-00-15
motor operator.
Valve Rating: 1500 #ASA

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