

Public Service  
Electric and Gas  
Company

**Stanley LaBruna**

Public Service Electric and Gas Company P.O. Box 236, Hancocks Bridge, NJ 08038 609-339-4800

Vice President - Nuclear Operations

**AUG 31 1990**

**NLR-N90172**

United States Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Gentlemen:

SUPPLEMENTAL RESPONSE TO BULLETIN 88-04  
SALEM GENERATING STATION  
UNITS NOS. 1 AND 2  
DOCKET NOS. 50-272 AND 50-311

Public Service Electric and Gas Company (PSE&G) hereby submits its revised response to Bulletin 88-04. As a result of the Integrated Performance Appraisal Team (IPAT) inspection concern, PSE&G performed an additional review of the forenamed bulletin.

The results of the follow-up review and the actions taken by PSE&G are provided in the attachment.

Should you have any further questions with regard to this submittal, please do not hesitate to contact us.

Sincerely,



Attachment

00033

9009120100 900831  
PDR ADDCK 05000272  
Q PNU

TE37  
11

Document Control Desk  
NLR-N90172

2

AUG 31 1990

C Mr. J. C. Stone  
Licensing Project Manager

Mr. T. Johnson  
Senior Resident Inspector

Mr. T. Martin, Administrator  
Region I

Mr. Kent Tosch, Chief  
New Jersey Department of Environmental Protection  
Division of Environmental Quality  
Bureau of Nuclear Engineering  
CN 415  
Trenton, NJ 08625

REF: NLR-N90172  
Bulletin 88-04

STATE OF NEW JERSEY            )  
  ) SS.  
COUNTY OF SALEM                )

S. LaBruna, being duly sworn according to law deposes and says:

I am Vice President - Nuclear Operations of Public Service  
Electric and Gas Company, and as such, I find the matters set  
forth in our letter dated \_\_\_\_\_, concerning the  
Salem Generating Station, Unit Nos. 1 and 2, are true to the best  
of my knowledge, information and belief.

*S. LaBruna*

Subscribed and Sworn to before me  
this 30<sup>th</sup> day of August, 1990

*Laraine Y. Beard*  
Notary Public of New Jersey

LARAIN Y. BEARD  
Notary Public of New Jersey  
My Commission Expires May 1, 1991

My Commission expires on \_\_\_\_\_

## ATTACHMENT

### Response

NRC Bulletin 88-04 requested licensees to investigate and correct, as applicable, two mini-flow design concerns. The first concern involved the potential for dead-heading one or more pumps in safety-related systems that have a mini-flow line common to two or more pumps or other piping configurations that do not preclude pump-to-pump interaction during mini-flow operation. The second concern is whether or not the installed mini-flow capacity was adequate for even a single pump in operation. PSE&G's initial response to the Bulletin indicated that the Residual Heat Removal (RHR) pumps had individual recirculation lines and therefore, we eliminated the first NRC concern. However, during its review of NRC Bulletin 88-04, the pump-to-pump interaction potential in the RHR system was not recognized by PSE&G.

During the IPAT team inspection, PSE&G was questioned about the potential RHR pump-to-pump interaction concern. PSE&G's initial response was to indicate that individual recirculation lines were provided for Salem's RHR pumps. After further discussion with the IPAT team, PSE&G acknowledged the omission of the "potential" pump to pump interaction, and initiated an immediate investigation of the concern. This investigation involved contacting numerous utilities with similar RHR system configurations, a complete review of all available IST surveillance results, a fluid hydraulic review of the system by in-house engineering, and discussions regarding potential Emergency Operating Procedure (EOP) changes with Westinghouse. The initial review identified that this condition was precluded on Salem Unit 2 because of the location of the installed suction check valves (2RH76 and 2RH75). These check valves prevent flow between the suction of the pumps. Since the suction side communication is isolated, no recirculation flow will pass through the open discharge cross-connect line via the RH19 valves. These suction side check valves essentially assure the two RHR loops will remain isolated from each other. PSE&G is certain that Salem Unit 2 is not susceptible to this condition and will be further discussing this conclusion with Region I.

However, Salem Unit 1 was determined to be potentially susceptible as no suction side check valves are presently installed.

PSE&G notified the office of Nuclear Reactor Regulation (NRR) of this omission in the original response to Bulletin 88-04 and committed to revise that response.

Review of IST data indicated that the two Salem Unit 1 RHR pumps showed very similar performance data.

Calculation S-1-RHR-MDC-0537 was performed by in-house engineering personnel to demonstrate that dead-heading of the RHR pumps was not a concern for Salem Unit 1. The results of this calculation determined the recirculation flowrates, which would be expected for the weaker pump, at various differences in the Total Developed Head (TDH) for the pumps. The results are summarized below:

20 ft. difference between pumps (8.66psid) - total dead-head condition

18 ft. difference between pumps (7.79psid) - results in 63 gpm for weaker pump

15 ft. difference between pumps (6.49psid) - results in 146 gpm for weaker pump

10 ft. difference between pumps (4.33psid) - results in 289 gpm for weaker pump

In addition, calculation S-1-RHR-MDC-0544 was performed to determine the length of time that an RHR pump could operate with no recirculation flow. This calculation determined that an RHR pump could operate for 8 minutes with no recirculation flow before sustaining damage. Additionally, information received from the pump manufacture (Ingersoll Rand) indicated the RHR pumps could operate for approximately 30 minutes with recirculation flow rate of 100gpm. Based upon these calculations PSE&G modified Surveillance Procedure, SP(O)-4.0.5-P-RH(11), to physically evaluate the susceptibility of Salem Unit 1 RHR pumps to this condition and to ensure a TDH between pumps of less than 6.5 psi. The 6.5 psi (~150gpm) was chosen to ensure that adequate recirculation flow would be available to preclude pump damage. This test was performed satisfactorily on June 3, 1990, and it has been incorporated into the normal Technical Specification 4.0.5-P(RH)-11 Surveillance. Additionally, this test will be performed every 92 days until a permanent solution can be implemented. The results of the RHR pump parallel operation test is presented below;

No. 11 RHR pump - TDH 177 psid; recirc. flow 535 gpm

No. 12 RHR pump - TDH 176 psid; recirc. flow 542 gpm

These results clearly demonstrate that with both pumps operating in parallel, the difference in developed head between the two pumps (1psi) is not enough to dead-head the pumps. Additionally, the test also indicates flow rates of 500 GPM or more for each pump, while operating in parallel.

NLR-N90172

In addition to the testing, PSE&G has developed an EOP change involving the closure of one of the motor operated valves (RH19s), which cross-ties both loops, to physically separate the loops. This EOP modification has been agreed to by Westinghouse and is supported by a 10 CFR 50.59 safety evaluation. This change has been reviewed and is ready for implementation in the event that future testing indicates unsatisfactory results outside the established acceptance band of 6.5 psi.

PSE&G is aggressively pursuing a permanent solution to this issue and will implement an appropriate permanent field change by the end of the Unit 1 10th refueling outage.

NLR-N90172