Public Service
Electric and Gas
Company

Steven E. Miltenberger

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Vice President and Chief Nuclear Officer

SEP 11 1989
NLR-N89139

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

Gentlemen:

REQUEST FOR AMENDMENT
SALEM GENERATING STATION
UNIT NOS. 1 AND 2
FACILITY OPERATING LICENSE NOS. DPR-70 AND DPR-75
DOCKET NOS. 50-272 AND 50-311

In accordance with the requirements of 10CFR50.90, Public Service Electric and Gas Company (PSE&G) hereby transmits a request for amendment of Facility Operating Licenses DPR-70 and DPR-75 for Salem Generating Station, Unit Nos. 1 and 2, respectively. In accordance with 10CFR50.91 (b) (1) requirements, a copy of this request has been sent to the State of New Jersey.

The proposed change requests a modification to the operation of the Residual Heat Removal (RHR) system, to allow for more flexibility. The changes address the concerns of air entrapment and vortexing in the RHR system, with reduced Reactor Coolant System (RCS) inventory. The changes result from PSE&G's analysis of Generic Letter 87-12, "Loss of RHR While the RCS is Partially Filled" and Generic Letter 88-17, "Loss of Decay Heat Removal".

The NRC expressed it's willingness to approve Technical Specification changes to the minimum flow requirement, at the June 20, 1988 Westinghouse Owners Group meeting on RHR Mid-loop operation. Technical Specification changes to improve the Decay Heat Removal (DHR) reliability are also recommended in Generic Letter 88-17.

This amendment request is similar in intent to requests submitted to the NRC for the Callaway Plant, Shearon Harris Power Plant and approved for the Diablo Canyon Plant in February 1988.

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PSE&G believes that sufficient technical justification is provided to demonstrate that the proposed changes do not involve a significant hazards consideration, and that this LCR does not require a significant amount of technical review and should be processed as a Category 2 change.

Attachment 1 includes a description, justification and significant hazards analysis for the proposed changes. Attachment 2 contains the Technical Specification pages revised with pen and ink changes. Attachment 3 contains the Technical Specification pages with the changes incorporated. Attachment 4 contains the revised bases for LCO 3.9.8.1. Attachment 5 is a Westinghouse report for Salem Nuclear Generating Station Units 1 & 2, concerning RHR mid-loop operation in reference to GL 87-12. This report was previously submitted with our response to GL 87-12.

This submittal includes one (1) signed original, including affidavit, and thirty seven (37) copies pursuant to 10CFR50.4 (b) (2) (ii).

Should you have any questions regarding this transmittal, please feel free to contact us.

Sincerely,

Attachment

C Mr. J. C. Stone
Licensing Project Manager

Ms. K. Halvey Gibson
Senior Resident Inspector

Mr. W. T. Russell, 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-N89139

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

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

I am Vice President and Chief Nuclear Officer of Public Service Electric and Gas Company, and as such, I find the matters set forth in our letter dated September 11, 1989, concerning the Salem Generating Station, Unit Nos. 1 and 2, are true to the best of my knowledge, information and belief.

S. Miltenberger

Subscribed and Sworn to before me
this 11th day of September, 1989

Eileen M. Ochs

Notary Public of New Jersey

My Commission expires on EILEEN M. OCHS NOTARY PUBLIC OF NEW JERSEY My Commission Expires July 16, 1992

ATTACHMENT 1

LCR 88-10

PROPOSED LICENSE CHANGE
SALEM GENERATING STATION
UNIT NOS. 1 AND 2
FACILITY OPERATING LICENSE NOS. DPR-70 AND DPR-75
DOCKET NOS. 50-272 AND 50-311

I. Description of Change

Delete Salem Unit 1 Technical Specification LCO 3.1.1.3. Revise Salem Unit 1 Technical Specification Surveillance 4.9.8 and Salem Unit 2 Technical Specification Surveillance 4.9.8.1 to delete the words, "at a flow rate of greater than or equal to 3000 gpm ".

The proposed change would revise the numbering of the Unit 1 LCO and Surveillance Requirements from 3.9.8 and 4.9.8 to 3.9.8.1 and 4.9.8.1 respectively. This numbering scheme is consistent with Salem Unit 2 and the Westinghouse Standard Technical Specifications.

II. Reason for the Change

NRC Generic Letters 87-12 and 88-17 requested licensees to evaluate operation of the Residual Heat Removal (RHR) system, when the Reactor Coolant System (RCS) is partially filled. PSE&G performed an evaluation of Salem's RHR system. This evaluation revealed that the reliability of the RHR pumps could be increased by reducing the flow rate below the present Technical Specification limit. Reduced RHR flow rates provide a greater margin against vortexing and preclude an inadvertent loss of decay heat removal capability, due to air entrainment and cavitation of the RHR pumps.

PSE&G committed in our response to GL 88-17 to process a Technical Specification change to the required RHR flow rate, from 3000 gpm to a variable flow rate based on the decay heat rate, determined as a function of time after shutdown. This amendment request satisfies that commitment.

III. Justification for Change

Evaluation of Salem's RHR system revealed that, reducing the RHR flow rate to <1800 gpm precludes air entrapment and vortex formation. Further review considered the minimum RHR flow rate necessary to: (1) remove decay heat (2) preclude boron stratification, and (3) provide an adequate flow rate for boron dilution accident concerns.

Table 1 (attached, excerpt from attachment 5 page 54) indicates the required RHR flow rate for specified periods of time after shutdown. Mid-loop operation is not implemented at Salem until at least 72 hours after shutdown (by procedure). Adequate decay heat removal can be accomplished with <1500 gpm RHR flow at this time. The required flow rate decreases further with increased time after shutdown. This is graphically depicted in Figure 1 (attached,excerpt from attachment 5 page 56).

Westinghouse evaluated the effect on net positive suction head (NPSH), for flow rates between 1000 and 3000 gpm. Sufficient RHR pump suction head is available at these reduced flow rates.

The potential for boron stratification was evaluated for RHR flow rates greater than 1000 gpm. The basis for preventing boron stratification in the RCS is to minimize the potential for a boron dilution accident. RHR flow rates greater than 1000 gpm ensure that adequate mixing occurs within the RCS. Thus, there is no concern for boron stratification above an RHR flow rate of 1000 gpm.

Figure 2 (attached, excerpt from attachment 5 page 57) depicts limitations on RHR flow rate for various RCS hot leg water levels. The data reveals that RHR flow rates should be maintained between 1000 and 1800 gpm when RCS hot leg water level is < 6 inches above centerline. RHR flow rates can be extended from a maximum of 1800 gpm to 3000 gpm, when RCS hot leg water level is > 6 inches above centerline. Figures 1 and 2 show that required RHR flow rates vary based on RCS water level and the time after shutdown. More importantly, the present Technical Specification minimum flow rate (3000 gpm) <u>exceeds the maximum flow rate specified for vortexing concerns.</u>

PSE&G believes that the RHR minimum required flow rate of 3000 is too restrictive and that the minimum required flow rate should not be specified in the Technical Specifications. Due to the many factors influencing RHR flow rate requirements, limitations on RHR flow rate are more appropriately controlled administratively within plant procedures, with the Design Basis documented in the UFSAR. These changes will allow more flexibility in mid-loop operation and address such factors as actual decay heat, RCS hot leg water level and RHR pump vortexing.

Salem Unit 1 Technical Specification LCO 3.1.1.3 is not in the Standard Technical Specification (NUREG-0452), nor is it a Salem Unit 2 requirement. Consequently, its deletion will provide consistency between all of these documents. Deletion is justified, because operation in Modes 1-3 requires a minimum of at least one Reactor Coolant Pump (RCP) in service. This guarantees that the flow rate is much greater than 3000 gpm.

Operation in Modes 4-6 will be addressed within plant procedures. Established limits will be based on: decay heat, RCS water level, boron stratification and vortexing concerns. The requirement to have RCS loop(s)/RHR system(s) operable ensures that the system has the necessary available capacity to deal with all decay heat rates. Thus, relocation of the RHR flow rate requirements to plant procedures will not decrease the ability of the RHR system to perform its design function.

IV. Significant Hazards Consideration

The proposed changes to the Technical Specifications:

1. Do not involve a significant increase in the probability or consequence of an accident previously evaluated.

   The Technical Specification requirement to maintain the minimum Reactor Coolant Loop in operation will ensure adequate RCS flow for Modes 1-4. The RHR loop OPERABLE LCO will ensure adequate RHR availability. The minimum RHR flow requirement will be specified in plant procedures. This change will increase the overall reliability of the RHR pumps by addressing vortexing concerns at higher flow rates. Therefore, it may be concluded that the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Do not create the possibility of a new of different kind of accident from any accident previously evaluated.

   The proposed change only allows reduced flow rates when the RHR system is in service. The reduced flow rates are justified by analysis and controlled by plant procedures. Since the RHR system will be maintained OPERABLE as required by the Technical Specifications and the procedural guidance, no new or different accident from any previously evaluated will be created.

3. Do not involve a significant reduction in a margin of safety.

   The proposed changes allow a reduction in the minimum RHR flow rate. Although this results in a reduced capability to remove decay heat and decreases the amount of mixing in the RCS, the minimum flow specified in plant procedures ensures that adequate margin is maintained.

The flow reduction eliminates the potential for air entrapment and vortexing of the RHR pumps due to excessive flow rates. Thereby, increasing the reliability of the RHR pumps, while maintaining sufficient flow to ensure the RHR design requirements are met. Therefore, it may be concluded that the proposed changes do not involve a significant reduction in a margin of safety.

V. Conclusions

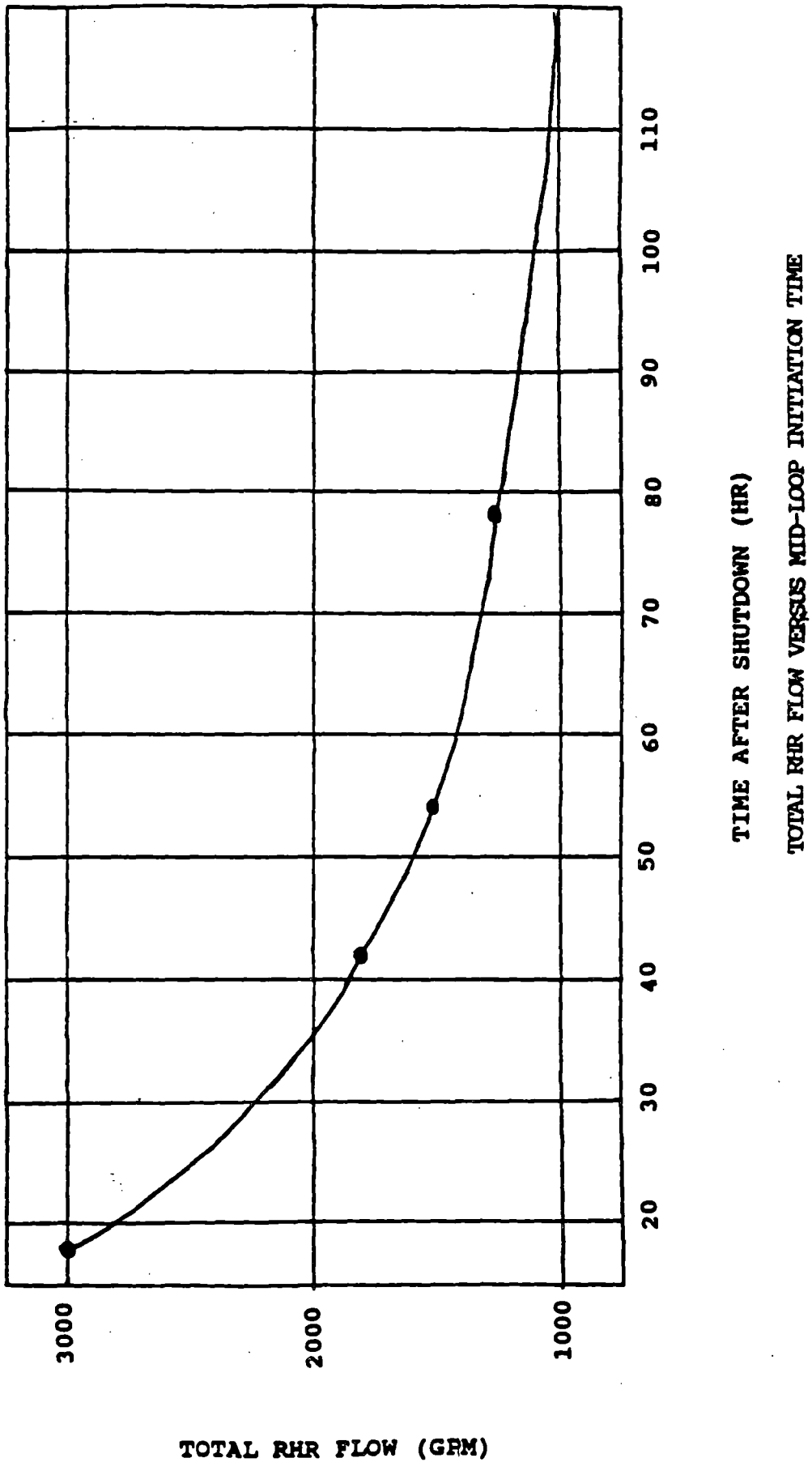
Based on the information presented above, PSE&G has concluded that the proposed changes satisfy the criteria for a no significant hazards consideration.

TABLE 1

MINIMUM REQUIRED RHR FLOW VERSUS TIME AFTER SHUTDOWN

MINIMUM REQUIRED RHR FLOW VERSUS TIME AFTER SHUTDOWN	
TIME AFTER S/D (HOURS)	TOTAL RHR FLOW (GPM)
18	3000
42	1800
54	1500
78	1250
114	1000

FIGURE 1


TOTAL RHR FLOW VERSUS MID-LOOP INITIATION TIME
TIME AFTER SHUTDOWN (HR)
20
30
40
50
60
70
80
90
100
110
TOTAL RHR FLOW (GPM)
3000
2000
1000

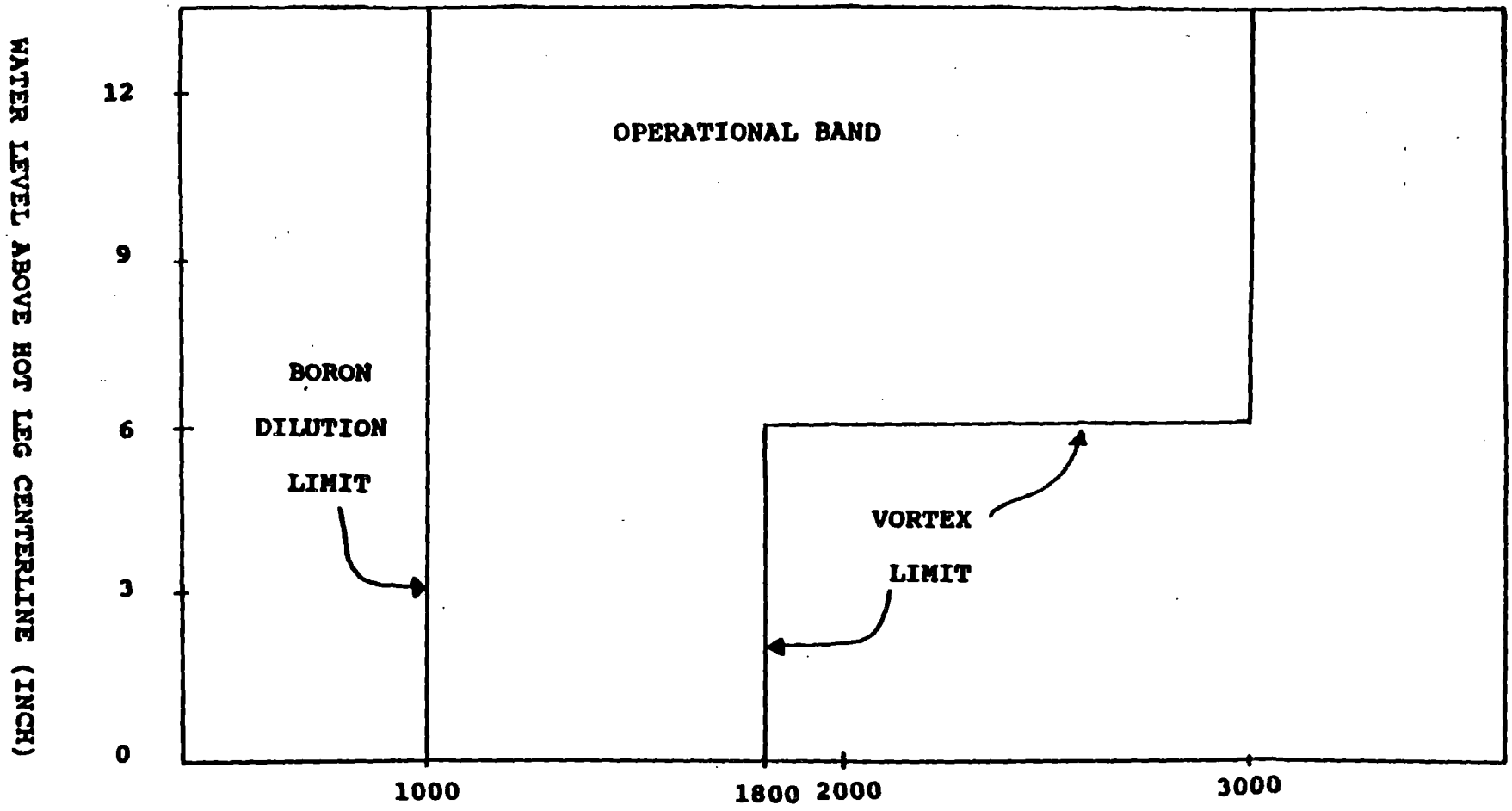


FIGURE 2

RCS WATER LEVEL VERSUS TOTAL RHR SUCTION FLOW

ATTACHMENT 2