Public Service
Electric and Gas
Company

Steven E. Miltenberger

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December 20, 1988

NLR-N88157

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

Gentlemen:

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

In accordance with the requirements of 10 CFR 50.90, 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 Unit Nos. 1 and 2. In accordance with the requirements of 10 CFR 170.21, a check for $150.00 is enclosed. A copy of this request has been sent to the State of New Jersey as indicated below.

This amendment request deletes the portion of surveillance requirement 4.5.2.i associated with verifying that the Residual Heat Removal (RHR) System suction/isolation valves automatically close on a Reactor Coolant System pressure signal. Issuance of this amendment is necessary to allow PSE&G to remove the RHR Autoclosure Interlock (ACI) circuitry during the upcoming Salem Unit 1 refueling outage. This modification is justified because it results in a net safety benefit.

Attachment 1 includes a description, justification and significant hazards analysis for the proposed change. Attachment 2 contains the technical specification pages revised with pen and ink changes. Attachment 3 contains the technical specification pages with the change incorporated.

Contingent upon approval, PSE&G plans to make plant modifications associated with this request during refueling outages. Modifications on Salem Unit 1 are planned during the upcoming eighth refueling outage, currently scheduled to begin in April 1989. Salem Unit 2 modifications are planned for the fifth refueling outage, currently scheduled to begin in January 1990. Therefore, the effective amendment date for each unit should be restart following these respective refueling outages.

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w/check #150
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This submittal includes one (1) signed original, including affidavit, and thirty-seven (37) copies pursuant to 10 CFR 50.4(b)(2)(ii).

Sincerely,

Attachments

C Mr. J. C. Stone
Licensing Project Manager

Ms. K. Halvey Gibson, Acting
Senior Resident Inspector

Mr. W. T. Russell, Administrator
Region I

Ms. J. Moon, Interim Chief
New Jersey Department of Environmental Protection
Division of Environmental Quality
Bureau of Nuclear Engineering
CN 415
Trenton, NJ 08625

REF: License Change Request 88-11

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

Steven E. 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 December 20, 1988 , concerning Salem Generating Station, Unit Nos. 1 and 2, are true to the best of my knowledge, information and belief.

Steven E. Miltenberger

Subscribed and Sworn to before me
this 20th day of December, 1988

Eileen M. Ochs
Notary Public of New Jersey

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

My Commission expires on

ATTACHMENT 1

DESCRIPTION OF CHANGE

Surveillance Requirement 4.5.2.i requires that the automatic isolation and interlock function of the Residual Heat Removal (RHR) system be verified within 7 days prior to placing the RHR system into service for cooling of the Reactor Coolant System (RCS). PSE&G has determined that removal of this RHR autoclosure interlock (ACI) is a net improvement in safety. Therefore we request that Surveillance Requirement 4.5.2.i be revised to delete the requirement to test the autoclosure interlock circuitry. Note that only the autoclosure interlock circuitry is being removed. The open permissive circuitry will remain in place.

REASON FOR CHANGE

This change is being requested to allow for the removal of the RHR ACI circuitry on Salem Units 1 and 2. The ACI circuitry functions to ensure that the two inlet suction valves (RH-1 and RH-2) provided on the inlet line from the RCS to the RHR system are fully closed when the RCS is pressurized above 580 psig. This design feature was added to provide additional protection against an interfacing LOCA (RCS bypass of containment through a pressure interface). However, throughout the industry, failures in the ACI circuitry and spurious signals due to test and maintenance activities have caused the suction valves to automatically close, resulting in a loss of decay heat removal during cold shutdown and refueling operations. The consequences from a total loss of RHR cooling under certain conditions could lead to bulk boiling, core uncovering, and resultant fuel damage.

Both the industry and the NRC have recognized the safety benefits of removing the RHR ACI. The authors of the NRC-AEOD case study on long term decay heat removal (Reference 1) recommend that the NRR consider the removal of the RHR ACI to minimize loss of decay heat removal events. Also, a study performed for the NRC by the Brookhaven National Laboratory (Reference 2) listed several improvements to reduce the risk of loss of RHR cooling. One improvement was removal of the RHR ACI.

Pacific Gas & Electric Company requested NRC approval to remove the ACI in 1987 based on probabilistic arguments. This request was granted in a safety evaluation dated February 17, 1988 (Reference 3).

In parallel with these developments, the Westinghouse Owners Group initiated a program to evaluate the removal of the RHR ACI on all Westinghouse designed plants. The end product of this program was WCAP-11736 (Reference 4). This report documents a plant specific evaluation for the removal of the

RHR ACI for four reference plants: Salem Unit 1, Callaway Unit 1, North Anna Unit 1, and Shearon Harris Unit 1. The portions of this report applicable to Salem Unit 1 are also applicable to Salem Unit 2, as both units have the same design configuration. Twenty four copies of this report were submitted to the NRC for their information in a letter from the Westinghouse Owners Group dated April 22, 1988 (Reference 5).

WCAP-11736 documents the probabilistic analysis performed on the removal of the RHR ACI in terms of 1) the likelihood of an interfacing LOCA, 2) RHR system availability, and 3) low temperature overpressurization concerns. The results of the analysis show that 1) the frequency of an interfacing system LOCA decreases with the removal of the ACI, 2) removal of the ACI increases the RHR system availability, and 3) removal of the ACI has no effect on the heat input transients, but will result in an insignificant increase in the frequency of occurrence for some types of mass input transients with a decrease in others. The net effect of ACI deletion is a net improvement in safety.

To provide assurance that the RCS will not be pressurized with the RHR system inlet valves open, the report required that a safety grade alarm be added that will actuate in the control room given a "VALVE NOT FULLY CLOSED" signal in conjunction with a "RCS PRESSURE-HIGH" signal. The intent of this alarm is to alert the operator that the RCS/RHR series suction/isolation valve(s) is not fully closed, and that double valve isolation from the RCS to the RHR system is not being maintained. The report further states that applicable operating procedures should be modified to reflect this new alarm and describe the appropriate response. Operating procedures should be revised to direct the operator to take action to close the open RHR suction/isolation valve, or if this cannot be done, return to a safe shutdown mode of operation. The probabilistic analysis was based on the implementation of this modification and revised operating procedure. These changes will be in place at Salem Station prior to PSE&G implementing the requested Technical Specification change.

PSE&G reviewed WCAP-11736 for accuracy in preparation of this submittal. A number of comments were made, mostly editorial in nature. These comments were transmitted to Westinghouse personnel associated with the Westinghouse Owners Group for their consideration. Westinghouse has communicated to PSE&G by letter that these comments do not impact the conclusions of WCAP-11736 (Reference 6). A number of these comments correct minor errors in WCAP-11736. These comments are enclosed in this attachment following the significant hazards consideration section. Please be aware of these comments when reviewing WCAP-11736, as they resolve some inconsistencies in the report with regard to the Salem Units.

While WCAP-11736 was under development, PSE&G modified the Salem Unit 1 ACI circuitry with a time delay. This time delay is designed to "time out" spurious RCS overpressure signals that had been experienced previously. This change provides some degree of protection against loss of decay heat removal events. However, it does not provide the absolute safety enhancement that removal of the ACI circuitry affords. Therefore, PSE&G is requesting this license change be granted so that the greater safety enhancement can be gained.

SIGNIFICANT HAZARDS CONSIDERATION

The proposed change does not involve a significant hazards consideration because operation of Salem Generating Station Units 1 and 2 in accordance with this change would not:

(1) involve a significant increase in the probability or consequences of an accident previously evaluated. The deletion of the RHR ACI was analyzed in WCAP-11736 in terms of (1) the frequency of an interfacing LOCA, (2) the availability of the RHR system, and (3) the effect on overpressure transients.

With the removal of the ACI and addition of a control room alarm, the probabilistic risk analysis predicts a decrease in the frequency of interfacing LOCAs from 8.35E-07 to 5.77E-07/year, a decrease of approximately 31%.

The availability of the RHR system was analyzed in three phases: initiation, short term cooling, and long term cooling. The probabilistic analysis indicated that deletion of the RHR ACI has no impact on the failure probability for RHR initiation. During short term cooling (72 hours after initiation), RHR ACI deletion decreased the RHR failure probability by 13%, from 1.60E-02 to 1.40E-02. The long term cooling RHR failure probability was calculated to decrease by 67% from 3.60E-02 to 1.20-E02.

Appendix D of WCAP-11736 presents the analysis used to determine the effect of removal of the ACI on overpressurization transients. The analysis categorizes the types of initiating events, determines their frequency of occurrence, and then identifies the consequences of these occurrences both with and without the ACI feature. The result is a list of overpressure consequence categories with associated failure probabilities (see Reference 4, Appendix D, Tables D-9,-10 and-11). For the charging/safety injection event, consequence frequencies increased on the order of 1.0E-10 shutdown year. This is an insignificant increase as the overall consequence frequency of the charging/safety injection event is 1.25E-01. Likewise, for the letdown isolation with RHR system operable case, one frequency category was increased on the order of 1.0E-11. Again this

is insignificant when compared with the total frequency of these events of 1.25E-01. For the letdown isolation with RHR system isolated event, the overall consequence frequency was reduced from 4.45E-01 to 2.22E-01. This occurs because many spurious closures of the RHR isolation valves cause the isolation of letdown.

Removing the RHR ACI reduces the frequency of this event by approximately 50%. It is concluded that the removal of the RHR ACI circuitry has an insignificant impact on the frequency of overpressurization events at Salem Station.

(2) create the possibility of a new or different kind of accident from any accident previously evaluated. The effect of an overpressure transient at cold shutdown conditions will not be altered by removal of the RHR ACI function. With or without the ACI function, the RHR system could be subject to overpressure for which the RHR relief valves must be relied upon to limit pressure to within RHR design parameters. While it is true that the ACI initiates an automatic closure of the RHR suction/isolation valves on high RCS pressure, overpressure protection of the RHR system is provided by the RHR system relief valves and not by the slow acting suction/isolation valves that isolate the RHR system from the RCS. This is reflected in the Salem UFSAR, which states:

"Isolation of the RHR System is achieved with two remotely-operated series stop valves in the line from the RCS to the RHR pump suction and by two check valves in series in each line from the RHR pump discharge to the RCS, plus a remotely-operated stop valve in each discharge line. Overpressure in the RHR System is relieved through a relief valve to the pressurizer relief tank in the RCS." (Reference 7)

The purpose of the ACI feature is to ensure that there is a double barrier between the RHR system and RCS when the plant is at normal operating conditions, i.e., pressurized and not in the RHR cooling mode. Thus the ACI feature serves to preclude conditions that could lead to a LOCA outside of containment due to operator error. The safety function of the ACI is not to isolate the RHR system from the RCS when the RHR system is operating in the decay heat removal mode.

There are several methods to ensure that there is a double barrier between the RHR system and the RCS when the plant is at normal operating conditions. First, plant operating procedures instruct the operators to isolate the RHR system during plant heatup. Second, an alarm that will be installed as part of this change would annunciate in the control room given a "VALVE NOT FULLY CLOSED" signal in conjunction with a "RCS PRESSURE-HIGH" signal. This alarm

would alert operators that either the RH1 or RH2 valve is not fully closed, and that double isolation has not been achieved. In conjunction with this, operators will be trained using revised alarm response procedures to ensure they act to restore double isolation or return to a safe shutdown condition. Third, the open permissive interlock, which is not being removed, will prevent the opening of the RH-1 and RH-2 whenever the the RCS pressure is greater than the RHR system design pressure.

Since relief valves prevent overpressurization of the RHR system during shutdown conditions and several methods are in place to ensure that the RHR system is isolated from the RCS during normal plant conditions, removal of the ACI does not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) involve a significant reduction in a margin of safety. The RHR ACI function is not a consideration in a margin of safety in the basis for any Technical Specification. However, since the probabilistic analysis of WCAP-11736 indicates that the availability of the RHR system is increased with the removal of the ACI, overall safety has been increased.

Based on these considerations, Public Service Electric and Gas Company has determined that this change does not involve a significant hazards consideration.

CLARIFICATIONS OF WCAP-11736

The following comments should be considered when reviewing the sections of WCAP-11736 applicable to Salem Station.

1) Table 4-1, "General Information on WOG Plants in Program", lists the RHR operating parameters as 350 PSIG and 350 F for both Salem Units. The conditions for initiating RHR are 350 F and 375 PSIG.

2) Figure 4-1, "General RHR Design For Group One Plants", shows only one crosstie valve normally open. Both crosstie valves are normally open in order to supply flow from each RHR to all four RCS cold legs. Also, the minimum flow line valves on the RHR pumps are globe valves, not motor operated gate valves.

3) Per Amendments 55 and 83 to the Salem Technical Specifications for Units 1 and 2, the revised hot leg switchover time is 14 hours instead of 22.5 hours shown on page 5-5.

4) Page 5-5 states that the RHR system is placed in operation when reactor coolant temperature and pressure are reduced to 350 F and less than 360 PSIG. Consistent with comment #1, RHR cooling is initiated when the reactor coolant is below 375 PSIG.

5) Per Salem Unit 1 and 2 Technical Specification 4.5.2.i, the ACI setpoint is 580 psig for an increasing RCS pressure. Per plant procedures, the open permissive interlock setpoint is 390 psig for a decreasing RCS pressure. WCAP-11736 lists a number of different setpoints of these interlocks on the following pages: 5-8, 5-13, 5-17, 5-19, Figure 5-2, Figure 5-3, 6-1, Figure 6-1, Figure 6-2, 9-6, 9-7, D-17, Table D-7 Item 4a and 4b. Only the 580 psig ACI setpoint and the 390 psig open permissive setpoint values should be used.

6) On page 5-10, the correct valve number for 1RH105 is 11SJ45.

7) On page 5-11, under the description for gate valve 1RH-26, it states that during hot leg recirculation RHR pumps are realigned to discharge through discharge cross connect valves. Per plant emergency operating procedures for hot leg recirculation, only one RHR pump (No. 12 for Salem Unit 1) is realigned to discharge through discharge cross connect valve 12RH-19 and common discharge valve 1RH-26. Consistent with comment #3, this alignment is initiated approximately 14 hours after a postulated accident and ECCS initiation.

8) With reference to Figure 5-1, "Salem Residual Heat Removal System", valve number 1RH-105 should be changed to 11SJ45, the minimum flow valves for the RHR pumps are globe valves and not motor operated gate valves, valve 11RH19 is normally open like 12RH19, and valve 12CC11 is a gate valve like valve 11CC11.

9) On page 7-32, Table 7-5, "Transient Event Outcome Descriptions", Category HOPI states that "The operator must reduce pressure, possibly through the RCS vents or pressurizer safety valves." Operator action can be credited to reduce the RCS pressure through the use of power operated relief valves (PORVs) only.

10) Page 9-5 states that the RHR relief valve setpoint is 450 psig with a 10% accumulation. The current set pressure of the relief valve on the suction side is 375 psig, with a relieving capacity of 840 gpm. Note that Table 4-1 lists the correct data.

11) Page C-7 of Appendix C states that the RHR pumps are tested monthly. However, pumps are tested every three months. (The monthly interval is more conservative in the unavailability analysis.)

12) Page D-16 states that the POPS system will actuate when the system is enabled and RCS temperature is below 368 F. The POPS system is armed at an RCS temperature of 312 F per Technical Specification requirements. Note that Table D-7 lists this correctly.

REFERENCES

1) U. S. Nuclear Regulatory Commission, Office for Analysis Evaluation of Operational Data, Case Study Report AEOD/C503 "Decay Heat Removal Problems at U. S. Pressurized Water Reactors", December 1985.

2) U. S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, NUREG/CR-5015, "Improved Reliability of Residual Heat Removal Capability in PWRs as Related to Resolution of Generic Issue 99", May 1988.

3) U. S. NRC Safety Evaluation of Removal of RHR Autoclosure Interlock Function and Installation of an Alarm at Diablo Canyon Units 1 and 2, Docket Nos. 50-275 and 50-323, February 17, 1988.

4) N. L. Burns and others, "Residual Heat Removal System Autoclosure Interlock Deletion Report for the Westinghouse Owners Group", WCAP-11736, Volumes 1 and 2, Revision 0.0, February 1988.

5) Letter from R. A. Newton (WOG) to M. W. Hodges (NRC), OG-88-17, April 22, 1988.

6) Letter from S. A. Binger (WOG) to F. X. Thomson (PSE&G), ESBU/WOG-88-162, September 30, 1988.

7) Salem UFSAR Section 5.5.7.2, page 5.5-28, revision 7.

ATTACHMENT 2