UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO.69 TO FACILITY OPERATING LICENSE NO. DRP-75

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

SALEM GENERATING STATION, UNIT NO. 2

DOCKET NO. 50-311

1.0 INTRODUCTION

By letter dated January 27, 1983 (Reference 1), Public Service Electric & Gas Company requested an amendment to Facility Operating License Nos. DPR-70 and DPR-75 for the Salem Generating Station, Unit Nos. 1 & 2. The proposed amendment would provide for semiautomatic switchover of ECCS from injection to the recirculation mode. The licensee's request was amended in a letter dated January 3, 1986 (Reference 5) to apply only to Unit 2 and responded to NRC questions in a letter dated January 5, 1987 (Reference 6).

In supplement 4 to the Salem 2 OL SER (Reference 2), dated April 1980, a manual switchover procedure, for changeover from the injection mode to the recirculation mode, was found acceptable. Further, the same SER established a requirement for Salem Unit 2 to provide an engineered safety feature design for automatic switchover from the injection mode to the recirculation mode. The licensee was required to submit a proposed conceptual design for automatic switchover, identifying each change, within 90 days after issuance of the low power license.

In early response to the above SER requirement, on June 5, 1980, a meeting (Reference 3) was held to discuss a proposed conceptual design by the licensee.

In Reference 4, dated July 17, 1980, the licensee submitted the proposed conceptual design pursuant to the above SER requirement and as expressed in Technical Specification 9.2.

The staff review led to the discovery that the original design and implementation submitted for NRC review in 1980 (Refs. 3 and 4) were not formally approved. Discrepancies in design and procedure were noted among References 1, 3 and 4. After several meetings and phone conversations, the licensee submitted Reference 5 which describes the actual status and proposals for Unit 1 and Unit 2.

2.0 EVALUATION

Reference 1 requested a license amendment regarding system operability requirements for semiautomatic switchover for both Unit 1 and Unit 2. Reference 5 requested approval for modifications only to Unit 2 at this time. This is acceptable since the original requirement for automatic switchover (Ref. 2) only applied to Unit 2. Reference 5 also states the licensee's intention to propose appropriate future modifications based on cost benefit for both Unit 1 and Unit 2 in order to maintain design commonality. We agree with this approach and suggest a meeting with NRC and PSE&G to discuss matters that should be considered by PSE&G in this effort.

The staff has evaluated References 1, 3, 4 and 5 and agrees with the proposals and procedures. The automatic actions of the switchover system are designed to provide an uninterrupted flow of ECCS water to the core. Following a loss of coolant accident when the low-level alarm setpoint is reached in the RWST, the recirculation transfer system will automatically: 1) open the suction line valves between the RHR pumps and the sump, 2) start component cooling water to the RHR heat exchangers, 3) open crosstie valves between the charging and safety injection pumps, and 4) when the sump line valves are fully open, close the suction line to the RWST.

The containment spray, charging, and safety injection pumps would at this time all be taking suction from the RWST. Operator action is then required to open the suction lines from the RHR pumps to the charging and safety injection pumps and to close the suction lines to these pumps from the RWST. Safety injection pump miniflow is isolated to prevent containment sump water from flowing to the RWST. Miniflow for the safety injection pumps is not necessary during the recirculation period since the reactor system will have depressurized below the safety injection pump's shutoff head. The containment spray pumps are manually tripped by the operator. During recirculation containment spray is provided by the RHR pumps.

The Salem 2 RWST design incorporates level setpoints which provide approximately 214,000 gallons for injection phase operation. Assuming all ECCS pumps operate at the maximum flow rates, the earliest time after LOCA initiation that switchover will automatically occur is 14 minutes. When semiautomatic switchover is initiated approximately 129,300 gallons would be available in RWST for the transfer allowance. Again assuming that all ECCS pumps operate at the maximum flow rate, approximately 18 minutes would be available for the operator to perform the necessary switchover manual action to ensure a continued suction to the charging and safety injection pumps. The time available for manual action is extended since the automatic actions of opening the sump isolation valves and closing the RHR isolation valves reduces the RWST outflow by approximately one-half. For small break LOCAs the reactor system may remain pressurized

so that high pressure flow from the safety injection and charging pumps would be required for core cooling. The elevated pressure of the reactor for these small break LOCAs would reduce the injection flow below the maximum rate so that additional time for the switchover would be available.

The control room operator will be aided in performing the semiautomatic switchover procedure by a special status panel which mimics the logic involved in actuating the system. The status panel displays the actuation of all RWST level transmitter bistables, the initiation of SI and position of the valves that are automatically actuated by the system.

One important issue in the licensee's proposal is the removal of the power lock-out from the containment sump isolation valves (21 and 22 SJ 44). The opening of these valves is part of the first automatic step in the switchover. Switchover cannot now occur until an operator is dispatched to the local motor control center to restore power. For all practical purposes this defeats the intent of automatic switchover. The requirement for local power lockout was originally imposed by the regional office to maintain containment isolation during normal operation in case of a spurious opening of either SJ44 valve. The licensee now proposes that the local power lockout be removed and the SJ44 valves be placed in the closed position from the control room during normal operation. Technical Specifications appropriate to this are proposed by the licensee. The "Reactor Trip or Safety Injection" emergency procedure (EOP-TRIP-1) further verifies that the valves are in the closed position and disarmed. If and when a LOCA condition has been verified and switchover to recirculation is called for, the procedure for "Transfer to Cold Leg Recirculation" (EOP-LOCA-3) is implemented. One of the very early steps in EOP-LOCA-3 is to arm the SJ44 valves so that when the RWST low level is reached semi-automatic switchover will occur. We agree that removal of the power lockout and the modifications to emergency procedures are acceptable. The operator is instructed by the emergency procedures to monitor sump water level and ensure that the level is increasing before arming the sump isolation valves. This precaution protects the RHR pumps from loss of suction for certain beyond design basis events including multiple equipment failure. The operator is referred to other emergency procedures for the beyond design basis conditions of LOCA without a corresponding increase in sump water level. Operator procedures were required to include beyond design basis events as part of the TMI Action Plan.

The sump lines to the RHR pumps are not equipped with check valves. During the injection phase or following a spurious SI signal during normal operation, single failure of the sump line motor-operated valves might cause backflow into the containment sump from the RWST. During normal operation, the flooding of the containment would be detected by the operator before significant flooding could occur. The operator would receive a "valve off normal" alarm as soon as the valve opened, followed by a "high sump level" alarm so that remedial action could be taken.

With the exception of several containment isolation valves, all safety-related components which could be adversely affected by flooding are located above the containment flood level. The containment isolation valves would be shut within 10 seconds after the start of ECCS injection before flooding could occur.

The RHR pumps are not tripped during the semi-automatic switchover from the RWST to the sump. When the sump motor-operated valves initially open on low RWST level, the RHR pump suction will be connected to both the RWST and the sump. When the sump valves are fully open, the valves in the lines from the RWST to the RHR pumps are automatically closed. Suction to the RHR pumps will then be solely from the sump. During the period before the RWST line closure is completed, the RHR pumps may draw suction from either source. If no containment pressurization is assumed, flow would be from the RWST since that source has the highest static head. If the containment is pressurized, the RHR pumps may take suction from the sump immediately. Under this condition, the check valves in the RWST lines would be closed by reversed pressure, preventing loss of sump water to the RWST. The licensee evaluated the available NPSH to the RHR pumps from the RWST and from the sump without taking credit for containment pressure in accordance with Regulatory Guide 1.1. Adequate NPSH has determined to be available from either the sump or RWST during the switchover.

The staff concludes that the licensee's proposal to install semi-automatic recirculation capability at Salem Unit 2 is acceptable.

The technical specifications for semiautomatic transfer do not require that the low RWST level actuation channels be operable in Mode 4 (below 350°F in the reactor system). Operating procedures are provided to accomplish the transfer to the recirculation mode manually. Additional time would be available for the operator to accomplish the transfer manually if the reactor were in mode 4 since the decay heat rate would be reduced relative to operation at power. Manual transfer in Mode 4 is therefore acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (48 FR 35055) on August 2, 1983 and consulted with the State of New Jersey. No public comments were received and the State of New Jersey did not have any comments.

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security nor to the health and safety of the public.

Principal Contributor: W. Jensen

Dated: May 1, 1989

REFERENCES

1. E. Linden, Public Service Electric and Gas, to Director of Nuclear Reactor Regulation, ATTN: Mr. Steven A. Varga (ORB #1), January 27, 1983, Subject: Request for Amendment to Facility Operating License DPR-70 and DPR-75, Salem Generating Station, Unit No. 1 and 2, Docket Nos. 50-272 and 50-311.

2. U. S. Nuclear Regulatory Commission, NUREG-0517, Safety Evaluation Report related to operation of Salem Nuclear Generation Station, Unit 2, Public Service Electric and Gas Company, et. al., Supplement No. 4, April 1980.

3. NRC Meeting Summary Distribution, Docket No. 50-311 Salem Nuclear Generating Station Unit 2, Summary of Meeting on Automatic ECCS Switchover, dated June 24, 1980.

4. R. L. Mittl, Public Service Electric and Gas, to Director of Nuclear Reactor Regulation, ATTN: Mr. A. Schwencer, LB#3, July 17, 1980, Subject: Proposed Conceptual Design ECCS Automatic Switchover, Unit No. 2, Salem Nuclear Generating Station, Docket No. 50-311.

5. Letter from C. A. McNeill, Jr. (PSE&G) to Steven A. Varga (NRC) re: Semiautomatic Switchover from Injection to Recirculation, Salem Generating Station Unit No. 2, dated January 3, 1986.

6. Letter from C. A. McNeill, Jr. (PSE&G) to Director of Nuclear Reactor Regulation, ATTN: Mr. Vincent S. Noonan (PWR PD#5), January 5, 1987, Subject: Request for Additional Information.