LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION

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Direct Dial Number

December 3, 1982 SNRC-794

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Development of Flooding Detection and Isolation Procedures
Shoreham Nuclear Power Station - Unit 1
Docket No. 50-322

Dear Mr. Denton:

This letter is written in response to the September 9, 1982 NRC letter from A. Schwencer to M. S. Pollock "NRC Staff Position on Procedures for Suppression Pool Pumpback System (SER Open Item 39)" and supplements our previous submittal (SNRC-473, May 2, 1980).

Alarm Response Procedures and Operating Procedures are being modified to address both passive leakages during the post LOCA period and internal flooding on elevation 8'0" as a result of postulated moderate energy leakage cracks. The procedures will also include guidance regarding operator action for leakage crack effluent that is radioactive and/or thermally hot. The procedures will be incorporated into the Shoreham Station Procedures Manual and become a part of the operator training program to ensure prompt termination of any leakage. LILCO is also participating in the BWROG program to develop a Secondary Containment Control Procedure which will provide additional specific guidance for operator response to postulated flooding events.

As stated in FSAR Appendix 3C, the RHR system in the shutdown cooling mode produces the maximum leakage crack flow rate and is the limiting condition for operator action time.* The postulated leakage rate of 2300 gpm results in a high water level alarm in the reactor building sump 1G11*LTS642C, followed by a high (1/2") reactor building floor water level alarm (1G11*LTS645 A or B).

Although an interval of 30 minutes (a flooding height of 20") is assumed, to allow the operator to detect and isolate the leakage (via termination of normal shutdown cooling), the actual operator action time would be much less and could be accomplished from the main control room using the aforementioned sump and high floor

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water level alarms and the various input available to the operator such as:

RPV water level indication
Area radiation and temperature alarms
RHR pressure and flow indication
Core spray keep fill line alarm

Even without operator action any RHR crack of this magnitude would result in a rapid RPV level decrease and subsequent automatic system isolation, long before a significant water buildup occurred on elevation 8'0". Continuous leakage could only result from the unlikely condition where the RHR system is operating and, prior to shutdown cooling isolation the operator increases feedwater flow to maintain the RPV water level. This bounding case was used to determine the leakage rate, response time and flooding level described in the FSAR.

As shown in FSAR Table 3C.5-1 other moderate energy leakage cracks are much less significant in terms of leakage rate. For example, the HPCI system leakage crack flowrate, which is secondary only to that of the RHR, amounts to just 650 gpm. This allows a period of approximately 2 hours before impacting the RHR safety related flow indicators. Other moderate energy cracks produce even lower leakage rates and, in several cases, the total leakage is limited, due to the closed loop design of the system.

Although addressed in the procedures, the temperature and radiation effects are not expected to adversely impact detection and isolation efforts. Only the RHR system, the Hot Water Heating (HW) system and the Reactor Water Cleanup (RWCU) system produce significant environmental impacts. Leakages from these systems are addressed below:

Any RHR System postulated leakage cracks can be detected and isolated from the control room.

The HW system is essentially a closed system with an inventory of approximately 7600 gallons. The system incorporates a 25 gpm transfer pump to provide system makeup to the hot water expansion tanks. Since the postulated leakage flow rate is 140 gpm, the level in the expansion tanks will drop, initiating transfer pump start and, shortly thereafter, a locally mounted low level alarm (turbine generator building). Even without operator response to the HW local alarm or the aforementioned reactor building highwater level alarms the system inventory would be depleted resulting in less than three inches of water on the elevation floor. Steady state leakage of 25 gpm could continue for several days before reaching the 23" flooding level that serves as the basis of the study.

The postulated RWCU leakage crack flowrate is 180 gpm. The low flow rate allows ample time for detection and isolation using the:

System flow element logic which is designed to detect flow imbalance greater than approximately 50 gpm

Area radiation monitors

Reactor building sump and high floor water level alarms

All other postulated leakage cracks will permit the operator unlimited access to conduct a walkdown to determine the leakage source (FSAR section 3C.5.4.4). As discussed previously, for leakages other than the bounding RHR crack, a 30 minutes detection and isolation time (either from the control room or by a walkdown) although preferred, is not mandatory, as the flooding level will be below the 2 foot level for at least two hours. It is highly unlikely the operator would need 2 hours to locate any leak in the reactor building.

Piping in the elevation 8'0" area was surveyed to determine if water accumulation could submerge a leakage crack and hinder detection. The RHR piping has the greatest potential to become partially submerged prior to leakage termination due to the high flow rate and the proximity of the return line to the floor. However, as previously stated the RHR, HW and RWCU system postulated leakages can be detected and terminated from the control room.

All other systems are much less likely than the RHR system to experience leak submergence due to the lower leakage rates versus piping height off the floor. The applicable procedures will direct the operator to commence his walk through at the elevation 8'0" level. It is considered highly unlikely that a leak could become submerged in the time period between the occurrence of the high reactor building floor water level alarm and the subsequent operator walk-through of elevation 8'0". Even if submergence were to occur, however, it is anticipated that water turbulence in the area of the submerged crack be sufficiently obvious so as to assist in determining the crack location.

Leakages from higher elevations would normally reach elevation 8'0" via the floor drain system. For RHR cracks or other postulated leakages in excess of the floor drain capacity, a flow path utilizing open hatchways and stairwells occurs. A review of these leakage paths was performed to ensure no impact to safety related equipment essential for safe shutdown or decay heat removal. The study encompassed the potential wetting effects (by water up to 212°F) due to spraying, dripping and/or cascading from higher elevations.

The arrangement of safety related equipment in the reactor building, combined with sufficient redundancy minimizes the effect of a moderate energy leakage crack at all building elevations. In all cases shutdown method III as described in Section 3C 3.4.3.2 is available for safe shutdown, decay heat removal and maintenance of RPV inventory.

The revised procedures will be available for on site review by mid-January, 1983.

LILCO believes that the above information should be sufficient to enable the staff to close SER item number 39 on the Shoreham docket.

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* Although low pressure and high pressure ECCS safety related equipment can potentially be submerged due to a postulated moderate energy leakage crack, flooding levels up to approximately 4'0" above the elevation 8'0" floor can be postulated without impacting safety related equipment essential for safe shutdown or decay heat removal. The moderate energy study, in FSAR Appendix 3C, utilized a conservative level of approximately 2 feet above the floor as its basis. The establishment of this flooding level as the upper bound ensures the function of RHR flow indication, which although not essential for safe shutdown, nonetheless provides a valuable indication to the operator.

Very truly yours,

J. L. Smith

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Shoreham Nuclear Power Station

RJT/law

cc: J. Higgins
All Parties