LILCO
LONG ISLAND LIGHTING

LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION

P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

August 7, 1981

SNRC-612

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

SHOREHAM NUCLEAR POWER STATION - UNIT 1
DOCKET NO. 50-322

Dear Mr. Denton:

Enclosed herewith are fifteen (15) copies, per your directive, of LILCO responses to specific NRC concerns which were previously identified as requiring additional information to complete NRC review. Attachment A provides a list of the specific responses included.

If you require additional information or clarification, please do not hesitate to contact this office.

Very truly yours,

BR McCaffrey

B. R. McCaffrey
Manager, Project Engineering
Shoreham Nuclear Power Station

CC/law

Enclosures

cc: J. Higgins

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ATTACHMENT A

Additional and/or revised information is provided for the following:

1) NUREG-0737, item II.K.3.27 - Common Reference Level for Vessel Level Instrumentation

2) NUREG-0737, item I.C.5 - Procedures for Feedback of Operating Experience to Plant Staff

3) SER Open Item No.52 - Management Organization

4) NUREG-0737, item II.F.1 Attachment 2 - Sampling and Analysis of Plant Effluents

5) SER Open Item No.11 - Supplemental ECCS Calculations with NUREG-0630 Model

    a) Prepressurized vs. Non-Prepressurized Fuel

    b) Rupture strain and Oxidation

6) SER Open Item No.52 - Management Organization (NUREG-0737 item I.A.1.3, Shift Manning)

7) NUREG-0737 item I.D.1 - Control Room Design Review

8) NUREG-0737, item II.K.3.28 - Study and Verify Qualification of Accumulators on ADS valves

Clarification for Item II.K.3.27 - Additional Information, Common Reference Level for Vessel Level Instrumentation

LILCO previously committed to providing a common water level reference by modifying the two fuel zone instrument indications to reflect the same reference zero (the bottom of the dryer skirt) as the other nine water level indications. The following additional information is provided regarding that modification.

Presently the two instruments, one fuel zone water level indicator and one fuel zone water level recorder, have a range of +50 to -150 with reference points at 50, 0, -50, -100, and -150.

The instrument face plates will be modified to indicate a common water level reference range using scale values graduated in accordance with standard human factors requirements of "1, 2, or 5". In addition, zone markings will be changed, if necessary, to align with the appropriate scale values. This is consistent with the other water level indications which provide the following indications:

(a) Shutdown Range: 0 to +400 in increments of 100 inches.

(b) Narrow Range: 0 to +60 in increments of 10 inches.

(c) Wide Range: +60 to -150 with reference points at +60, +50, 0, -50, -100, and -150.

Rev. 8-5-81

Revision to NUREG 0737 Item I.C.5 (see SNRC-608)

Evaluation and Information Network is initially screened by INPO and NSAC.

(6) The Plant Manager, The Chief Engineers, and the Section Heads are responsible for assuring that the material they submit for inclusion on the Required Reading List does not include conflicting or contradictory information. The Training Supervisor, who administers the circulation of the Required Reading List in accordance with the Shoreham Station Procedure of the same title, serves as a further check to prevent the conveyance of conflicting or contradictory information.

The ISEG will note any contradictory or conflicting information in the material they review and will thereby prevent its conveyance to operators or other personnel. INPO and NSAC are taking special measures to avoid the dissemination of conflicting or contradictory information.

The ISEG will note any contradictory or conflicting information in the material they review and will thereby prevent its conveyance to operators or other personnel. INPO and NSAC are taking special measures to avoid the dissemination of conflicting or contradictory information via their issuances, thus all material received by ISEG from INPO/NSAC will have already been screened once.

(7) Shoreham procedures being written to govern the activities of the ISEG will provide for ISEG evaluation of the Shoreham feedback program. The Shoreham Nuclear Review Board will audit ISEG to assure this evaluation function is being performed.

The Training Supervisor or Section Heads may elect to include examination questions covering material from the operating experience feedback progress that has been incorporated into the Shoreham training program. This would provide additional quantitative measure of the effectiveness of the feedback cycle.

Revision to SER Open Item No. 52, Paragraph 11 (see SNRC-601)

c) Review of plant activities such as maintenance, modification, operational problems, and operational analysis.

d) Surveillance of plant operations and maintenance activities to provide verification that these activities are performed correctly and with minimum human error.

e) Review other appropriate sources of plant design and operating experience information that may indicate areas for improving plant safety.

f) Where useful improvements can be achieved, develop and present detailed recommendations to corporate management for such things as revised procedures or equipment modifications.

Additional Information for NUREG-0737 Item II.F.1-Attachment 2

The applicant will either provide a high range station vent sample in an accessible location or provide detailed justification that an accessible location, consistent with the design requirements of NUREG-0737, Reg. Guide 1.97 rev. 2, and ANSI N13.1, is not practicable for all postulated events.

Additional Information for SER Open Item 11

Supplemental ECCS Calculations with NUREG-0630 Model-Prepressurized vs. Non-prepressurized fuel.

NEDE-23786-1-P, Fuel Rod Prepressurization, Amendment 1, Section 4.2.1 demonstrates the benefits of prepressurization. The Shoreham ECCS analyses utilized non-prepressurized fuel and the results are, therefore, conservative relative to PCT and MAPLHGR.

SHOREHAM OUTSTANDING ISSUE #11

SUPPLEMENTAL ECCS CALCULATIONS WITH NUREG-0630 MODEL

This response supercedes in its entirety our previous submittal concerning this issue in letter SNRC-605 dated 7/23/81. Changes to the MAPLHGR and PCT values in FSAR Table 6.3.3-1 are no longer deemed appropriate.

The following summarizes the results of sensitivity studies performed to determine the impact of large cladding rupture strains on BWR LOCA heatup calculations. This letter supplements the reference 1 letter and further reiterates General Electric's position on the applicability and prototypicality of the open literature data with respect to circumferential strain.

1. Experimental Data

General Electric has performed an extensive survey of all open literature circumferential strain data prototypical to the BWR (ref.1). The salient points from this review are as follows:

a) General Electric circumferential strain versus temperature model is founded on a large data base of prototypical BWR data including full scale BWR bundle tests. (figure 8 of ref.1)

b) This model is an upper bound (≥90%) of the data (i.e. it is not a best estimate model).

c) The General Electric model bounds the applicable data transmitted in reference 3 and contained in figure 10 of reference 1 (note: Applicable data here refers to slow heat up rates* (less than 10°F/sec) in the high temperature region (900°C).

d) The NUREG 0630 correlations are unqualified for slow heat-up rates at temperatures above 900°C (1650°F) (figure 9 of ref.1).

e) The majority of open literature data was taken under conditions not prototypical of the BWR. Viz: heated shroud, uniform temperature profiles (i.e. no circumferential temperature variation).

To summarize, the General Electric model conservatively bounds 90% of the data considered most applicable. Therefore the continued use of the GE model in GE BWR LOCA analysis for the prediction of perforation strain is considered appropriate.

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*Note: General Electric definition of slow heat up rates is less than 10°F/sec not 10°C/sec.

2. Sensitivity Studies

Additional sensitivity studies have been performed to assess the impact on peak cladding temperatures (PCT)of individual local rod strains of 40 and 60%. Using the General Electric heat up model (CHASTE) a representative number of rods in the bundle were allowed to perforate with strains of 40%. The use of these 40% rupture strains results in a 15°F reduction in peak clad temperature over the current model which uses average strain values of 23%. This reduction in PCT is attributed to the increased surface area available for heat transfer. In the second study the peak clad temperature rod was allowed to swell and perforate with a strain of 60%. The remainder of the rods were not allowed to dilate during the transient. The peak cladding temperature for this case occured in a different rod and was approximately 70°F lower than the base case. The peak clad temperatures for the perforated rod (base case PCT rod) was reduced by 25°F. The change in the peak clad temperature rod results from the small difference (7°F) in the base case and the benefit of a larger heat transfer area for the perforated rod.

Summary

Increased rupture strains (40% and 60%) result in a small decrease in the calculated PCT compared to the current GE model (23% strain). This reduction in PCT is due mainly to the increased heat transfer area for the perforated rod.

Chaste Local Oxidation Calculation

The local oxidation calculation in Chaste was performed as a separate calculation (no feedback on PCT) using an input strain of 39% and the calculated PCT based on the average strain (23%). The value of 39% was chosen because it represents the mean of the high temperature maximum circumferential strain data presented in NEDE-20566-P.

FSAR table 6.3.3-1 indicates a maximum oxidation fraction of 3.5% compared to a maximum allowable of 17% per 10CFR50.46. The impact, if any, of increased strain on the metal water reaction could not be of any significance for Shoreham because of this five fold margin to the 10CFR limit.

References: 1) Letter from R. H. Buchholz (GE) to L. S. Rubenstein (NRC), "General Electric Fuel Clad Swelling and Rupture Model", May 15, 1981

2) "General Electric Company Analytical Model for Loss of Coolant Analysis in Accordance with 10CFR50 Appendix K - Volume 1", NEDE-20566-P, November 1975

3) Telecopy of LOCA Data from D. Powers (NRC) to D. K. Dennison (GE), February 10, 1981

Additional Information for Shift Manning - SER Open Item No.52
(NUREG-0737 item I.A.1.3)

Lilco application of the New York State Labor Law presently requires that meal periods be given at the end of the 4th and 10th hours. The operator would be temporarily relieved during these times.

In addition, if an operator were required to work in excess of eight continuous hours, an effort would be made, as a normal practice, to ensure that, during the course of his shift, he had a period of time that did not entail duty at the board.

8/6/81

I.D.1 CONTROL ROOM DESIGN REVIEWS

Additional LILCO Response to NRC Finding 6.20 - Containment Purge Control Valves

The valves in question (1T46*AOV38C, 38D, 39C, and 39D) are 18" suppression chamber purge valves. Prior to the decision to inert the Shoreham containment, these valves were intended to purge the suppression chamber periodically for hydrogen and pressure control.

With the implementation of the containment inerting system and the addition of a 6" vent line (1T46*AOV79A and B), the above valves will not be used during normal operation. Valves 38C, 38D, 39C, and 39D will be used to purge the suppression chamber prior to entry during shut down condition. Also, both valves have to be operated to perform the function and, from an operating point of view, relative switch vs. mimic location has little meaning.

The engineering and construction impact to relocate the switches as suggested by the Commission is very significant and cannot be justified since there is no benefit to changing from the present position. The impact is significant due to the complex barrier design within the panel to satisfy the separation criteria for these and other controls on this panel.

Each valve is individually key locked closed and under control of operational procedures. Furthermore, the switches will be color padded to enhance the functional control relationships.

In summary, Lilco believes that this individual NRC finding does not have any real safety significance and given the aforementioned justification, plant modification is not warranted.

Revision to NUREG 0737 item II.K.3.28 - Study and Verify Qualification of Accumulators on ADS Valves (see SNRC - 601)

If at the end of the short term accumulator header leak test, it is found that 70 psig cannot be maintained, each ADS short term accumulator shall have its pressure checked locally to verify it is greater than or equal to 70 psig via a test gauge. Following this test, the header will be vented and the pressure stabilized at some lower value for a certain period of time. Subsequent pressure buildup would be indicative of ADS short term accumulator check valve leakage. If such buildup occurs, the accumulators will be examined to determine the leakage source. Any short term accumulator system unable to maintain 70 psig will be repaired/modified, and retested to verify leak-tight integrity. This test will be performed periodically on a schedule consistent with the Shoreham integrated leak rate test to be performed during reactor shutdown for refueling, but in no case at intervals greater than three years.

5. Since the ADS accumulator system is important to safety, it must meet the requirements of the GDC 2 and 4. The ADS accumulator system, and associated control circuitry, from the ADS valve operator out to and including the accumulator system isolation check valve should be seismically and environmentally qualified. Acceptable methods for demonstrating this qualification are given in SRP Sections 3.9.2, 3.10, and 3.11, as supplemented by the Category I requirements of NUREG-0588.

Response to Item 5:

The seismic and environmental qualification criteria for Shoreham are described in FSAR Sections 3.10 and 3.11. In addition, comprehensive description and status reports for both the seismic and environmental qualification program have been submitted by SNRC-575 dated May 28, 1981, and SNRC-576 dated May 27, 1981 respectively. As described therein, Class IE electrical equipment is qualified in accordance with NUREG-0588 Category 2.

The ADS accumulator system is qualified in accordance with the program outlined above and, therefore, meets the requirements of GDC 2 and 4.

6. The applicant will perform a leak test prior to initial operation. The applicant should address the action to be taken if the leakage rate during the pre-operational testing exceeds that established in Item 2 above.

Response to Item 6:

The applicant will perform a leak test prior to initial operation. Should the leakage rate exceed that established in Item 2, the system will be repaired/modified as required.