LONG ISLAND LIGHTING COMPANY
SHOREHAM NUCLEAR POWER STATION
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Direct Dial Number

April 6, 1984 SNRC-1035

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

Additional Responses to Staff Concerns
Raised at the March 28, 1984 Meeting
Shoreham Nuclear Power Station - Unit 1
Docket No. 50-322

Dear Mr. Denton:

This letter furnishes additional responses to specific topics raised at the March 28 meeting in Bethesda concerning LILCO's Supplemental Motion for a Low Power Operating License.

1. Drywell Bulk Atmospheric Heatup In Response to a Loss of All AC.

LILCO letter SNRC-1014, dated February 16, 1984, contains our response to Generic Letter 83-24 and addresses this subject. As presented in Attachment 2 of SNRC-1014, the maximum drywell normal operating temperature limit of 145°F is exceeded in less than 30 seconds for the most conservative set of initial conditions assumed. The results presented in SNRC-1014 were derived assuming a full power operating reactor as opposed to the 5% power case addressed here. Hence, the difference in resultant long term temperature response.

The short-term (4 hours) results of our analysis were generated by General Electric using the design verified computer code VACBR. It was assumed that operator action is taken 30 minutes into the station blackout scenario to begin lowering the reactor pressure vessel (RPV) temperature at a

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rate of 100°F/hour. An initial peak temperature of 248°F is calculated to occur 800 seconds into this event. The following table provides the results of our analysis:

Time	Drywell Atmospheric Temp (°F)
0	135
800 sec.	248
0.5 hr.	242
1.0 hr.	236
1.5 hr.	231
2.0 hr.	225
3.0 hr.	215
4.0 hr.	206

As can be seen the temperature begins to drop after the 800 second mark but does so less rapidly as time goes on to the fourth hour. VACBR does not require a total heat conductance to be input for heat transfer from the RPV to the drywell air. Rather, material properties and geometry data is supplied.

Another calculation was performed to determine the bulk atmospheric temperature of the drywell 24 hours after the loss of AC scenario. This calculation assumed several heat conductances for the RPV to the drywell air heat transfer. The highest value used was 1.2×10^4 BTU/hr. °F and this corresponds to the maximum heat transfer capability of the drywell cooling system with the RPV at 550°F and the bulk drywell air temperature at 135°F. We reduced this maximum value by 1/2 (6×10^3 BTU/hr. °F) and 2/3 (4.4×10^3 BTU/hr. °F) and determined the effect on the final drywell temperature for each case. The drywell was assumed to be at a starting air temperature of 135°F and the RPV was assumed to be at 360°F (saturation pressure approximately 150 psia) over the twenty-four hour period. The results are tabulated below:

Heat conductance (BTU/hr. °F)	Drywell Temperature at the end of 24 hours (°F)
1.2×10^4	260
6.0×10^3	201
4.4×10^3	183

The actual heat conductance for the Shoreham Nuclear Power Station is within the range presented above.

The results of both analyses (short term and one day), presented in this letter and even those presented in SNRC-1014 demonstrate that the resultant bulk atmospheric drywell temperature is in range of the temperature response expected from the design basis accident as described in Section 6.2 of the SNPS FSAR and is below the qualification temperature for drywell equipment.

2. <u>10 CFR 50 Appendix K Reanalysis</u>

At the Staff's request we reanalyzed the time at which a 10 CFR 50.46 limit would be reached. Two items were considered:

a. By using a control rod withdrawal pattern which helps flatten the core power peaking factor to 3.38 we can extend the core uncovery time before reaching a 10 CFR 50.46 limit. Exhibit 4 of the affidavit of Dr. Glen G. Sherwood, Dr. Atambir S. Rao, and Mr. Eugene C. Eckert shows that a 10 CFR 50.46 limit is reached in 55 minutes for a Peak Rod MAPLHGR of 1.34 KW/ft. This case utilizes a core thermal peaking factor of approximately 5.0. By realistically assuming a proper control rod withdrawal pattern and hence a peaking factor of 3.38 one derives a Peak Rod MAPLHGR of 0.91 KW/ft. This results in a core uncovery time of 86 minutes before a 10 CFR 50.46 limit is reached (again in this case it is the temperature limit of 2200°F). The corresponding local oxidation is 7.4 percent.

b. If we now take into account the actual anticipated operating history of the core during the startup test phases described in the affidavit of J. A. Notaro and W. E. Gunther, the result is that an equilibrium core fission product inventory will not be achieved. Factoring this into the reanalysis a resultant core uncovery time of 110 minutes is available prior to exceeding a 10 CFR 50.46 limit. This 110 minute figure includes the reduced conservatism outlined in paragraph (a) above. Again the first limit reached is the 2200° F temperature and at this time (110 min.) the local oxidation is 8.5 percent.

3. <u>Realistic LOCA Analysis 5% Power</u>

Per your request we have, in conjunction with GE, performed a realistic LOCA analysis without the overconservatisms of 10 CFR 50, Appendix K. As in item 2 above we assume a Peak Rod MAPLHGR of 0.91 KW/ft. due to reduced peaking factors. In this case we assumed a convective heat transfer coefficient greater than zero from the rods to the cooling medium. This assumption is different from that called for by Section D.6.a of 10 CFR 50, Appendix K. We estimate that there would be between 3 to 4 hours available prior to reaching the 2200°F 10 CFR 50.46 limit. The computer code model used to perform this analysis was not set up to calculate 10 CFR 50.46 limits beyond three hours after LOCA. At the three hour mark the cladding temperature was calculated to be 1842°F and the

local oxidation is less than 17 percent. G. E. estimates that it would take a significant time period for the fuel temperature to climb from 1842°F to the 2200°F limit and, hence the 3 to 4 hour estimate.

Very truly yours,

B. R. McCaffrey
Manager, Nuclear Compliance & Safety

GJG:ck

cc: C. Petrone
All Parties Listed in Attachment I

ATTACHMENT I

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