LILCO
LONG ISLAND LIGHTING

LONG ISLAND LIGHTING COMPANY
SHOREHAM NUCLEAR POWER STATION
P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

June 27, 1979

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Shoreham Nuclear Power Station - Unit 1
Docket No. 50-322

Gentlemen:

On June 18, 1979 we submitted responses to your questions asked and document requests made during the June 5 and 6, 1979 meeting with LILCO, Stone & Webster, the NRC Staff and SC/ERG. In that submittal we stated that a portion of the response to question 4 pertaining to contentions 5a, 5b, and 5c as well as the response to question 6 under contention 20a(i) would be forwarded under separate cover. Enclosed herewith are the separate responses.

Very truly yours,

J. P. Novarro

J. P. Novarro,
Project Manager
Shoreham Nuclear Power Station

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Enclosures

cc: Members of the Board
All Parties

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Q.6 Provide a representative example of the implementation of the philosophy addressed in Q.5 above for shielded components.

A.6 The design philosophy for the Radwaste Building which ensures that occupational radiation exposures are as low as practicable, is contained in FSAR Section 12.1.2. An example of the implementation of this philosophy for the condensate demineralizers is given below.

The activity buildup on the condensate demineralizers occurs due to the removal of radioactivity from the reactor water in the condensate and feedwater stream.

For the shielding analysis, the computer code IONEXCHANGER was used to conservatively calculate the equilibrium activity buildup in the demineralizer, which is listed in Table 1.

The activity in Table 1 is used as input to computer code 'RADIOISOTOPE' to determine the source spectrum and intensity (Mev/sec) for the seven energy groups listed in Table 2. These are then divided by the demineralizer volume (200 ft^3) to obtain the source strength in Mev/cc-sec.

This source strength is input to the shielding computer code QAD-MOD along with the geometry shown on Figure 1 to obtain the dose rate as a function of shield thickness.

Because the area outside the condensate demineralizer is one of controlled infrequent access (radiation zone V), the design criteria require that the maximum allowable dose rate be less than 100 mrem/hr. But structural factors require the use of 2 ft. of concrete in the wall shielding the demineralizers. This thickness of concrete results in the

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dose rates shown in Figure 1, which are less than the 100 mrem/hr. design dose rate.

A brief description of the computer code mentioned above follows:

IONEXCHANGER - based on a known fluid feed rate with radioisotope activities, it calculates the activity of each isotope (and its products) on a demineralizer or in a tank.

RADIOISOTOPE - based on initial activity of isotopes at time = zero, it calculates the activity of each isotope (and its products) at any later time.

It also calculates the specific gamma energy activity for each of seven fixed energy groups.

QAD-MOD - is used to calculate the dose rate at a series of detector locations for a number of different source points representing volumetric sources.

The program is a modified version of the QAD P-5 program written at the Los Alamos Scientific Laboratory by R. E. Malenfant.

The QAD P-5 program has been updated to include, 1) the FASTER geometry routines, 2) a point source option, 3) a translated cylindrical source volume option, and 4) internal library data for conversion factors, buildup factor coefficients, and

mass attenuation factors for several materials and compositions. The program was also modified to 1) reduce and simplify the required card input, 2) simplify the printed output, and 3) include an option to have the summary table data punched on cards for input into the QADSUM program.

Details of the QADMOD calculations are described by R. E. Malenfant in "QAD, A Series of Point-Kernel General-Purpose Shielding Programs" published by Los Alamos Scientific Laboratory, LA-3573 (1966).

TABLE 1

CONDENSATE DEMINERALIZER ACTIVITY BY ISOTOPE

ISOTOPE	(uCi) TOTAL ACTIVITY FOR SEVEN UNITS	ONE CONDENSATE DEMINERALIZER
I-131	3.4+08	4.9+07
I-132	5.3+08	7.6+07
I-133	2.5+08	3.6+07
I-135	1.1+08	1.6+07
Sr-89	3.5+07	5.0+06
Sr-90	4.6+06	6.6+05
Sr-91	1.7+06	1.2+06
Sr-92	3.7+06	5.3+05
Y-91	5.5+06	7.9+05
Y-92	3.7+06	5.3+05
Mp-99	2.0+07	2.9+06
Tc-99m	3.9+07	5.6+06
Te-132	5.0+07	7.1+06
Cs-134	3.0+06	4.3+05
Cs-137	4.7+06	6.7+05
Cs-140	3.6+07	5.1+06
La-140	3.6+07	5.1+06
Na-24	4.9+05	7.0+04
Cr-51	1.6+06	2.3+05
Mn-54	1.5+05	2.1+04
Co-58	1.8+07	2.6+06
C0-60	1.9+06	2.7+05
Np-239	1.8+08	2.6+07

TABLE 2

SOURCE SPECTRUM FOR CONDENSATE DEMINERALIZER

ENERGY (MeV)	SOURCE STRENGTH (MeV/cc-sec)
.4	1.7+05
.8	9.6+05
1.3	2.6+05
1.7	2.1+05
2.2	6.0+04
2.5	3.3+03
3.5	0.0