UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of LONG ISLAND LIGHTING COMPANY (Shoreham Nuclear Power Station, Unit 1)	Docket No. 50-322 (O.L.) (Emergency Planning Proceedings)

DIRECT TESTIMONY OF GREGORY C. MINOR

ON BEHALF OF SUFFOLK COUNTY

REGARDING

CONTENTIONS EP 10B, EP 10C (RADIATION MONITORING)

AND EP 14 (DOSE ASSESSMENT)

OCTOBER 12, 1982

Summary Outline of Direct Testimony of Gregory C. Minor on Behalf of Suffolk County Regarding Contentions EP 10B and EP 10C, (Radiation Monitoring) and EP 14 (Dose Assessment)

There is a large uncertainty in the measurement of the quantity of iodine which may be released from the Shoreham plant during an accident. Thus, it seems prudent and necessary to improve the plant monitoring or to obtain a greater number of readings from the field in a more timely manner. The present field survey team approach has limitations with respect to the timeliness, accuracy, and thoroughness of data collection and dose assessment. There is a need to improve the measurement of iodine release, resulting dose rates, and prediction of public exposure by knowing more accurately:

(1) the quantity of iodine released as a function of time;

(2) the dose rates for iodine as a function of time in the plume exposure zone; and

(3) the integrated dose received by the public in the exposure zone.

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DIRECT TESTIMONY OF GREGORY C. MINOR ON BEHALF OF SUFFOLK COUNTY RELATING TO CONTENTIONS EP 10B AND EP 10C (RADIATION MONITORING) AND EP 14 (DOSE ASSESSMENT)

Q: Please state your name and affiliation.

A. My name is Gregory Minor, and I am employed by MHB Technical Associates in San Jose, California.

Q. Have your professional qualifications been previously submitted in this proceeding?

A. Yes. They were submitted in connection with my direct testimony on Suffolk County Contention 7B.

Q. What is the purpose of your testimony?

A. This testimony addresses aspects of Suffolk County emergency planning contentions EP 10 and EP 14.

Q. What aspects of those contentions are you addressing in this testimony?

A. In particular, I am testifying on EP 10B and 10C, dealing with monitors for emergency planning, and EP 14, dealing with the equipment used to assess accidents and prepare emergency responses.

Q. Are you familiar with the applicable portions of LILCO's Emergency Plan and Implementing procedures used for projecting doses following release of radioactive material?

A. Yes, I have reviewed Sections 6.1, 7.3.2 and Appendix E of the Emergency Plan for Shoreham, and I am familiar with their content. I have also reviewed the following applicable implementing procedures: SP 69.022.01 Rev. 0, Determination of Offsite Doses; SP 69.023.01 Rev 0 Thyroid Dose Commitment Using TCS Air Sampler, SP 69.021.01 Rev. 0, Onsite Surveys; and SP 69.020.01 Rev. 0, Downwind Surveys. These documents, particularly SP 69.022.01, refer to two methods of dose assessment to be used following an offsite release. One method is a computerized model that is not described and therefore its effectiveness as a dose assessment tool is unknown; the other is a manual calculation based on radiation readings obtained from plant release points.

Q. What data does SP 69.022.01 call for in assessing an emergency condition?

A. The procedure calls for the operator to determine certain characteristics of the release, particularly the height of the release to assist him in classifying the release as an "elevated release" or a "ground release." The operator is also asked to obtain from the control room the reading of the radiation monitor that indicates the counts per minute of release gases in the particular stack involved -- either the station vent or the reactor building standby ventilation system (RBSVS) release point.

Q. What type of data do the monitors that you just mentioned provide for the operator?

A. The monitors that are referenced in the procedure are not specifically defined. However, they appear to be gamma monitors, on the stack, of low and intermediate range.[1/] I believe there will eventually be reference in the procedure to a high range monitor on each of the stacks (the station vent and the RBSVS vent.) These monitors measure the radiation from the gamma sources present in the release gases but they do not distinguish between the different isotopes which may be present (e.g. noble gases and iodine).

Q. What data is called for in the LILCO procedure to provide an indication of the quantity of iodine being released?

A. The procedure does not call for a direct indication of the quantity of iodine being released. Instead, there is an arbitrary ratio, 25 percent of the halogen LOCA mixtures, assumed to be released during a LOCA or other design basis accident.[2/]

1/ SP 69.022.01 page 6 (step 8.2.1.11) p. 12 (step 14).

2/ Shoreham Emergency Plan, page 6-1, and Table 6-1.

This quantity is assumed to be further reduced by 99% through filtration.[3] This is not an actual indication of the release, but merely a value that is used for the manual calculation of dose rates which would be expected in the field certain distances away from the plant. This manual calculation technique is used when the computer is not available for calculating dose projections.

The procedure mentions that grab samples may be used if the stack effluent monitors are inoperable or off-scale. However, grab samples provide only a momentary sample of the release and their availability may be limited due to access restrictions. Absent other than the reference to a grab sample, there is no reference in the procedure to the use of a direct indication of iodine in the release in making projections of thyroid dose.

Q. Does Shoreham have equipment capable of providing a direct measurement of iodine being released in the event of an accident?

A. Yes. There is equipment installed at the Shoreham plant for sampling the stack release and drawing the sample through a filter, which will remove the iodine from the gaseous release and collect it for a period of time. The filter may then be

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3/ Procedure SP 69.022.01 p.2, step 3.4.2.

measured on a separate piece of equipment. Using the measurement of iodine, together with the knowledge of the sampling rate, the velocity in the stack, and the uncertainties in the measurement, one could calculate the approximate quantity of iodine that was actually released during the sampling period.

Unfortunately, as installed at Shoreham, this sampling system has severe limitations, particularly for the measurement of iodine releases during accident conditions. If there is a large release of iodine up the stack or through the reactor building standby ventilation system, the samplers on those vents would draw a sample of the gases through tubing to a location where the filter is mounted. The length of this tubing is such that there is a considerable amount of plateout, or depositing of the iodine on the tube wall, along the route to the filter. According to LILCO's study of the accuracy of Iodine Sampling/Monitoring,[4/] the effect of this plateout is a delay in the buildup of iodine in the filter during the time when it is instead being deposited on the walls of the tubing. Eventually, the quantity of iodine being plated out will equal the iodine that becomes re-mobilized; and an equilibrium value

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4/ Report by LILCO documenting resolution of Suffolk County Contention 28a(iii).

will be reached when the rate of collection on the filter equals the quantity in the sample. Unfortunately, the time needed to reach this equilibrium value may be as much as several hundred hours, in which case, it would render this device relatively useless in establishing the actual magnitude of release of iodine during the early phase of an accident.

Q. Does the problem that you have identified with respect to LILCO's ability to obtain a direct measurement of iodine release have any impact on the adequacy of LILCO's accident assessment capability?

A. Yes, there is a direct relationship to the issues raised in EP 14. In my opinion, there is a need to compensate for the lack of direct knowledge of the iodine released by taking appropriate steps to measure or calculate the dose rates that would be experienced in the field as a result of a release. Accurate data is the most important need. For that reason, the assumption of release of 25 percent, further reduced by a 99% filtration factor, of the iodine inventory may be misleading. It may either underestimate or overestimate the amount of iodine which would actually be released. In the absence of more accurate measurements of the actual release, the assumed release could cause unnecessary emergency actions or could delay the decision to take appropriate actions.

Q. Are there any other methods for obtaining measurements of actual iodine release?

A. There are at least two other methods that are available to the plant's personnel, if time and personnel permit during the early phases of an accident. One is the use of grab samples where a sample of the air in the stack would be obtained and taken to the on-site laboratory where it would be measured. However, it would be difficult to obtain accurate measurements of the amount of iodine released using this method, because a grab sample would only represent an instant of time and not the overall release of iodine from the stack. The second method involves the use of the post-accident sampling system to draw samples of the reactor coolant or the containment atmosphere, to attempt to determine what quantities of iodine are present and what ratios of isotopes are present in the coolant. Knowing this would permit the operator to make a more reasoned and valid estimate of the quantity of iodine that is available for release, but it would not provide a measure of the quantity of iodine that was actually present in the release. Also, these samples may not be available for up to three hours after the declaration of an emergency.[5] Once the release has occurred, the only other means of assessing the iodine release is by measurements in the field.

5/ Emergency Plan, page 6-5.

Q. Does the LILCO emergency plan provide for supplementation of offsite dose predictions through the use of field data?

A. Yes. LILCO's Emergency Plan (Section 6.1.2) and procedure SP 69.020.01 call for survey teams to go into the field and make measurements at pre-determined locations in the sectors expected to be exposed to radiation doses from the plume. These teams may be asked to pick up thermoluminescent dosimetry devices ("TLDs") which are placed in the field to measure the integrated whole body dose experienced at 36 fixed locations.[6/] Although those TLDs measure integrated dose, they do not address the concerns of Contention EP 10B because they cannot be remotely interrogated and they do not provide continuous indications. Furthermore, the teams will also have the ability to draw air samples and make measurements of the iodine and particulate present in the sample, as well as to measure the dose rate at the time that the survey team is in a particular location. However, their samples would not be continuous readings (a single reading would cover only five minutes of collection time) and the measurements would probably not cover the entire duration of the plume exposure at the location. Moreover, the teams would not be able to cover all areas, as they would be sent only to the pre-determined locations or

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6/ Emergency Plan, Table 7-2.

alternate routes that are decided between the EOF and the survey teams. Physical impediments, such as traffic congestion, may also restrict or delay their measurements in some areas. The procedures describing their functions are SP 69.023.01 "Thyroid Dose Commitment Using TCS Air Sampler," and SP 69.020.01, "Downwind Surveys."

Q. In your opinion, is the LILCO method adequate to provide data to supplement offsite dose predictions?

A. In my opinion, it is not. The reasons are that there are only a limited number of TLDs in the field which would provide integrated dose measurements, and then would do so only for their particular locations; and, there are only limited iodine measurements from air samples which will be taken by the field survey teams. Also, the nomogram for dose projection in SP 69.023.01 requires specific knowledge of the starting time of the release of iodine, and this may not be available from existing plant monitors due to delays and inaccuracies. The nomogram also requires knowledge of the time that exposure began at the sample location. This data may be inaccurate due to uncertainty in estimating the start of iodine release and in estimating the time for the plume's leading edge to reach the sample site. Furthermore, measurements of iodine are going to be too few to accurately predict the exposure of the public in the entire area influenced by the plume. Finally, it should be noted that the NRC reviewed the equipment and procedures to be used in accident assessment and monitoring at Shoreham, including those mentioned in this testimony, and found numerous deficiencies.[7/] These deficiencies included:

1. incomplete installation and testing of radiation monitors and computer used to support emergency classification, assessment and response functions;
2. incomplete installation and operability of Post Accident Sampling System;
3. incomplete operational testing of effluent sampling systems for gases and particulate, including iodine;
4. incomplete procedures including one for sampling and analysis of stack effluents during accidents and deficiencies in SP 69.020.01 (Downwind Surveys).

Q. Please summarize your testimony.

A. In view of the large uncertainty in the measurement of the quantity of iodine which may be released from the plant during an accident, it seems prudent and necessary to improve the plant monitoring or obtain a greater number of readings from the field in a more timely manner. The present field survey team approach has limitations with respect to the timeliness,

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7/ Emergency Preparedness Appraisal 50-322/82-18, Sept. 30, 1982. See Sections 4.1.1.1, 4.1.1.5-.7 4.2.1.1, 5.1, 5.4.2 and 5.4.2.1.

accuracy, and thoroughness of their data collection and dose assessment. There is a need to improve the measurement of iodine release, resulting dose rates, and public exposure by knowing more accurately:

(1) the quantity of iodine released as a function of time;

(2) the dose rates for iodine as a function of time in the plume exposure zone; and

(3) the integrated dose received by the public in the exposure zone.

Q. Does that conclude your testimony?

A. Yes.