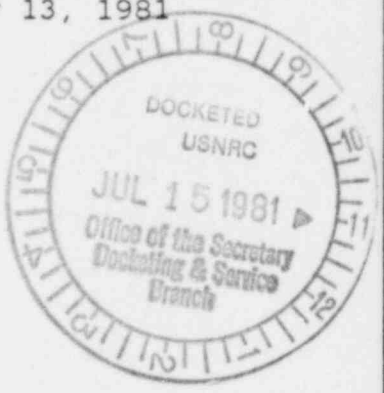
July 13, 1981



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

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

LILCO MOTION FOR SUMMARY DISPOSITION OF SOC CONTENTION 2

The Contention

By Board Order of June 26, 1980, SOC Contention 2 was admitted as follows:

> Intervenors contend that the emergency planning requirements for the 50-mile (radius) ingestion pathway for the Shoreham facility, as set forth in the NRC Policy Statement of October 23, 1979 (44 Fed. Reg. 61123), are inadequate in that they do not adequately address the effects of releases through the liquid pathway.

Material Facts As To Which There Is No Genuine Issue To Be Heard

1. The NRC Policy Statement of October 23, 1979 (44 Fed. Reg. 61123) referenced in SOC Contention 2 has been superceded by the NRC's final rule on emergency planning. 45 Fed. Reg. 55402 (1980).

2. The Commission's emergency planning rule relies specifically on the work of the Emergency Planning Task Force set out in "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," NUREG-0396, EPA 520/1-78-016 (1978). See, e.g., 10 CFR §50.45(s)(1) n.2, 45 Fed. Reg. at 55410.

3. The NRC's final rule on emergency planning sets a generic requirement for a fifty mile (radius) ingestion pathway emergency planning zone (EPZ). 10 CFR §50.47(c)(2), 45 Fed. Reg. at 55409, see also NUREG-0396 at 16 ("it was the consensus of the Task Force that emergency plans could be based upon a generic distance . . . .").

4. The planning requirements for the fifty mile EPZ are set out in 45 Fed. Reg. at 55408-413. The standards that need to be met in order to comply with the rule are specified in "Criteria for Preparation of Radiological Response Plans for Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1 (1980). NUREG-0654 is incorporated by reference in the NRC's emergency planning rule. Nowhere in the rule or NUREG-0654 is there a requirement to analyze releases to the liquid pathway on a case-by-case basis. Rather, the necessary analysis was done generically during the rulemaking.

5. Thus, during the emergency planning rulemaking, the NRC considered the effects of a core "melt-through" release of radioactivity; a core "melt-through" release includes releases to a liquid pathway. Based on that consideration, the Commission concluded that the fifty mile ingestion pathway adequately ensured the health and safety of the public. See NUREG-0396, at I-44 to I-52. For instance, the Emergency Planning Task Force found that "[f]or the 'melt-through' class, projected whole body and thyroid doses in excess of PAG [Protective Action Guidelines] for those organs are, for all practical purposes, confined to areas within 10 miles of the reactor. Emergency response planning for this type of accident should therefore be primarily directed towards limiting the dose to those individuals located within that distance." Id. at I-50, see also 45 Fed. Reg. at 55406.

Argument

A.

SOC Contention 2 attacks the adequacy of "emergency planning requirements . . . for Shoreham . . . set forth in the NRC Policy Statement [on Emergency Planning]." (emphasis added). Since the Policy Statement referred to has been superceded by the NRC's emergency planning rule, the contention is, by its terms, a challenge to requirements adopted during the NRC rulemaking. SOC's

responses to LILCO's May 21 interrogatories underscore the fact that SOC objects to the results of the emergency planning rulemaking. For example, SOC claims "[t]he emergency action level guidelines described in NUREG-0654 for the Ingestion Pathway, including the guidance on the size of the EPZ appear to be derived from WASH-1400 and, thus, results in inadequate assessment of radioactive releases through the liquid pathway." Answers of the Shoreham Opponents Coalition (SOC) to Applicant's Interrogatories Dated May 21, 1981 at B-8 (SOC's Answers are attached to this motion).

But as just indicated the NRC did consider the possibility of releases to the liquid pathway when it generically set the size of the EPZ's. See Material Fact 5. The NRC concluded that the fifty mile ingestion pathway EPZ would provide adequate protection in the event of such a release. Id. In fact, according to the NRC, the impacts of liquid pathway releases would not be significant more than ten miles from the reactor. Consequently, the NRC saw no need to impose a requirement to analyze the effects of liquid pathway releases on a case-by-case basis. See Material Fact 4.

SOC disagrees, and has challenged the adequacy of the emergency planning rule. SOC, however, has failed to meet the requirements of 10 CFR § 2.758 for such a challenge.1/

1/ Nothing in SOC's Answers suffices to meet the § 2.758 criteria. It is also well to note that these answers raise a

Accordingly, it is impermissible.

B.

In the Company's view, nothing more need be said to support the summary disposition of SOC Contention 2. In the event more is needed, however, the attached affidavit of Brian R McCaffrey indicates why liquid pathway releases present no special problems for Shoreham.

Conclusion

SOC may not challenge the NRC's emergency planning requirements for the fifty mile EPZ without first satisfying 10 CFR § 2.758. SOC has failed to do so.

(footnote cont'd)

number of issues irrelevant to SOC Contention 2. Among other things, SOC asks that "potential interdiction systems, including emergency actions and the potential safety and environmental improvement . . . be developed as part of the Shoreham safety assessment and EIS." SOC's Answers at B-1. "Interdiction systems" seem to refer to some sort of new engineered safety feature. The need for such systems, if any, is the subject of the Commission's degraded core rulemaking. See Advanced Notice of Proposed Rulemaking, 45 Fed. Reg. 65474, 65476 (1980). SOC also attacks the adequacy of the Final Environmental Statement for Shoreham. The environmental phase of this proceeding has long been closed, however and this Board has denied SOC's attempts to revive it. See Board Orders of August 4, 1978, March 5, 1980 and May 1, 1980. Moreover, further consideration of the environmental impacts of Class 9 accidents has been foreclosed for Shoreham by Commission policy, 45 Fed. Reg. 40101, 40103 (1980), as well as a line of cases stemming from the Commission's decision in Offshore Power Systems (Floating Nuclear Power Plants), CLI-79-9, 10 NRC 257 (1979). See, e.g., Public Service Company of Oklahoma (Black Fox Station, Units 1 and 2), ALAB-587, 11 NRC 474 (1980).

Accordingly, no genuine issue remains to be heard concerning its Contention 2, and it should be summarily resolved under § 2.749.

Respectfully submitted,

LONG ISLAND LIGHTING COMPANY

Anthony F. Earley, Jr.

W. Taylor Reveley, III
Anthony F. Earley, Jr.

Hunton & Williams
P. O. Box 1535
707 East Main Street
Richmond, Virginia 23212

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B. SOC CONTENTION 2

In any melt-through resulting from a Class 9 accident at Shoreham, radioactive materials may leach into the groundwater or eventually migrate into the Long Island Sound. Models to assess the consequences of the possible contamination of water by radioactive releases on health, water supplies, costs, emergency plans, or interdiction techniques have not been adequately addressed generically in WASH-1400 or specifically by LILCO for Shoreham in the FSAR. SOC believes that little or no preparations have been made to interdict the flow of contaminated groundwater from beneath the reactor containment buildings should a meltdown accident occur. Omission of the liquid pathway releases from consideration in mitigating measures included in the eventual Shoreham emergency plan appears to be a fundamental deficiency. Therefore, SOC believes a description of potential interdiction systems, including emergency actions and the potential safety and environmental improvements, should be developed as part of the Shoreham safety assessment and EIS.

As set forth by LILCO in the FSAR, Long Island is underlain by soil deposits extending to depths ranging from a few tens of feet below sea level in northwestern Queens County to nearly 2,000 feet beneath the south of Suffolk County In central Suffolk County, test wells encountered rock at more than 1,400 feet below sea level. Rock is estimated to be approximately 1,000 feet below sea level at the Shoreham site. The materials that overlie the bedrock and constitute Long Island's groundwater reservoir are unconsolidated deposits of gravel, sand, silt, and clay.*

The natural groundwater elevations measured across the area occupied by the Shoreham plant varied from 7 to 10 mlw, but because the site might be flooded during extremely severe storms, and since the geological formations are very permeable, the design criteria for subsurface loadings included flooding considerations. The design of safety related structures has been reviewed to ensure they are capable of withstanding hydrostatic pressures and uplift due to a stillwater elevation of 26.0 mlw caused by inundation of the site by a storm surge. The natural groundwater elevations were temporarily lowered to various elevations during construction, as discussed in FSAR Section 2.5.4.6. However, there are no plans for permanent dewatering during the life of the plant.**

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* FSAR, page 2.4-21.

** FSAR, page 2.4-27

In the generic risk study, the authors of WASH-1400 indicate that "the effects of contamination of water supplies has not been considered in detail"* and assume without a detailed analysis that streams and rivers would be contaminated for only a "short time."** The inadequate analysis of water contamination is a major flaw in the WASH-1400 presentation. The financial costs and the societal dislocation due to major contamination from strontium-90 and other isotopes appear to be potentially very large. They deserve assessment in the Shoreham safety assessment.

The WASH-1400 authors also assumed that partial core melt always led to complete core melt. They further assumed, because of lack of direct experience, that once a core lost its initial configuration, it would be difficult to contain, i.e., even if the containment building above the core were not to fail, the core itself would probably melt through the concrete foundation. It is not clear that the core would necessarily follow this course. It may, instead, melt down but remain contained from below by the foundation due to adequate upward heat transfer. If the molten core has penetrated the containment building through the bottom, its interaction with the surrounding soil and water table was not well-defined.*** Furthermore, core melt-through was not evaluated with the same comprehensiveness as were atmospheric releases because of the latter's more immediately observable adverse effect.****

Finally, the WASH-1400 report indicates that airborne releases are much more significant contributors to the total risk

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* WASH-1400, Main Report, page 76.

** Wash-1400, Main Report, page 134.

*** Battelle Columbus Laboratories is continuing the studies that they prepared for WASH-1400 in two main areas - release fractions and the physical processes of a core meltdown. Battelle is developing a new code, MARCH, to describe the thermal and mechanical aspects of a core melt. At this time, there appears to be substantial uncertainty in modeling the core melt penetration.

**** Minutes of Meeting Five of the Risk Assessment Review Group, page 57.

than releases via the liquid pathway. The U.S. Department of Interior did not agree with the notion that the liquid pathway was as insignificant as indicated in the WASH-1400 report and recommended additional study of the effects of variation of the hydrogeological conditions from site to site.* The NRC accepted the comment and instituted a research program at Sandia. The Sandia study results for a set of generic reactor sites were released in draft form to the NRC and subsequently to MHB in early 1980.**

Figure 2-A provides a schematic diagram of flow of information in the basic computer programs used in the Sandia study. The general flow of information between the computer programs is indicated in the central column. Other programs either used to generate input data or else whose previously generated output was used as input data are given on the left side of the figure, while input data obtained from literature sources is shown on the right side.

Two sets of programs were used by Sandia as shown in Figure 2-A to describe the releases into the hydrosphere: INTER and WECHSL to provide information about both the appropriate time scales for the various possible releases and the overall composition of the melt in different environments; and SOURCE to calculate the amounts of radioactivity which go into each of the releases. The interaction of the melt with the structural material of the reactor, with the concrete floor of the containment and with the soil beneath the containment, were taken as described by the models employed in INTER and in WECHSL. SOURCE calculates the amount of every important nuclide contained in each of the three basic types of releases for any given WASH-1400 accident category, and any core inventory. The output of SOURCE consists of the amount of each radionuclide released into the groundwater as a function of time.***

Transport of the radioactivity in the hydrosphere was described by two programs: GRDWATR and SRFWATR. GRDWATR describes the transport of the radionuclides by groundwater movement from the area beneath the containment to any nearby surface water-bodies or wells, SRFWATR describes the subsequent transport in lakes, estuaries, oceans and river systems. With

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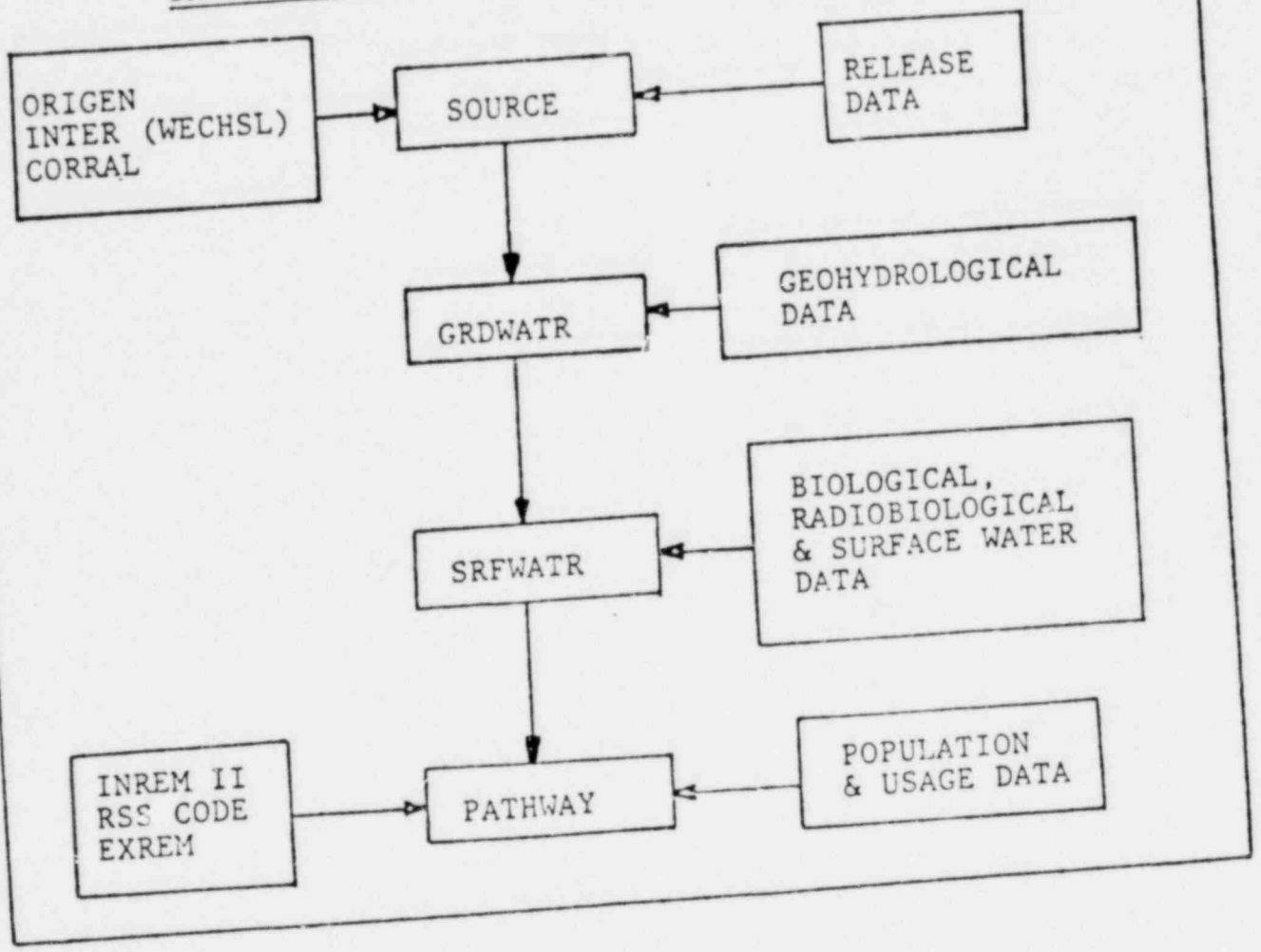
* NUREG-0410, NRC Program for the Resolution of Generic Issues Related to Nuclear Power Plants, January, 1978, Task A-33, page 2.

** Sandia Study (Draft) performed for the U.S. Nuclear Regulatory Commission, "Effect of Liquid Pathways on Consequences of Core Melt Accidents," January, 1980, (Provided to Black Fox service list for construction permit proceeding), Figure 1.2

*** Sandia Study (Draft), pages 10 to 13 of Chapter 1.

FIGURE 2-A

FLOW OF INFORMATION
SANDIA STUDY OF HYDROSPHERIC CONSEQUENCES



the exception of the river system program, simple analytic models have been employed to consider the movement within each waterbody; for the river system, a more complex compartment model has been developed. The output of GRDWATR is the amount of each nuclide crossing the aquifer-surface waterbody interface as a function of time; the output of SRFWATR is essentially the concentrations of the radionuclides in the water and in the sediment as a function of location and time.*

PATHWAY computes the radiation dose to the populations at risk, along with the resultant health effects. Essentially standard NRC Regulatory Guide 1.109 dosimetry models have been employed. The health effects models in PATHWAY are essentially the same as those used in WASH-1400. The output of PATHWAY consists of the radiation dose received by the population for each appropriate pathway as a function of each of four factors: time after the accident; accident category; type of release; and relative leaching rate. The total resultant health effects for each pathway are also tabulated.**

The differences between the radiation doses received through atmospheric pathways and through hydrospheric pathways can be understood by comparing and contracting the pathways themselves. The major differences, as described by Sandia, are reviewed in Table 2-A.***

The major conclusions by the Sandia authors in their draft report for plants like Shoreham without specific interdiction barriers were in part as follows:

a. "In contrast to the situation for releases to the atmosphere, the most probable RSS meltdown categories result in the largest releases to the hydrosphere. Significant amounts of radioactivity are generally expected to be released to the hydrosphere during any meltdown accident.

b. At approximately 50% of all the sites considered, there is estimated to be essentially no radiation dose to the human population as a result of releases

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* Sandia Study (Draft), pages 10 to 13 of Chapter 1.

** Sandia Study (Draft), pages 10 to 13 of Chapter 1.

*** Sandia Study (Draft), Table 1.1.

TABLE 2-A

DIFFERENCES BETWEEN ATMOSPHERIC AND HYDROSPHERIC PATHWAYS

	ATMOSPHERIC RELEASED	HYDROSPHERIC RELEASED
SOURCE	Atmosphere: Primarily more volatile radionuclides (I, Cs, Te,...).	Melt Debris: Primarily less volatile RN's (Ru, Sr, La,...)
		Sump water and depressurization: Primarily more volatile RN's.
DISPERSAL	Population reached rapidly (hours).	Population usually reached slowly (months to centuries longer).
	All RN's move essentially together; deposition mechanisms differ only for the noble gases.	Each RN moves through the ground at its own rate; each RN moves through the surface waterbodies with its own set of interactions.
PATHWAYS	Primarily inhalation and external (ground).	Primarily ingestion (drinking water, aquatic food) and external (shorelines)
	Dominant pathways are relatively simple.	Some dominant pathways are very complex.
	Populations are straightforward.	Populations are not obvious.
HEALTH EFFECTS	Acute, latent and chronic.	Primarily chronic.
INTERDICTION	Source: not possible. Pathway: possible	Source: often possible Pathway: possible.

to the hydrosphere via the hole in the containment basemat formed by the melt. At another 15% of the sites, there is estimated to be a resultant radiation dose of approximately 2 to 3 x 10^6 person-rem, while at the remaining 35% the potential dose is about 2 to 5 x 10^7 person-rem for such releases.

c. Variations of conditions at actual sites could easily result in the doses being either higher or lower than those obtained in this study by at least an order of magnitude. Likewise, reasonable variations in certain portions of the modeling could result in estimated doses which differed from those presented here by an order of magnitude.

d. The calculations indicate that if interdictive actions are not taken, then the liquid pathways can perhaps contribute significantly to the risk of core meltdown accident."*

Releases for a core melt accident through the liquid pathway could constitute a major problem for Shoreham because of the site characteristics set forth in the FSAR and summarized in the preceding. The impact of a core-melt accident through the liquid pathway can conceivably be reduced at Shoreham if certain mitigating measures are employed. Thus, the effects of interdiction, including emergency planning measures, both close to the site of the accident and farther along the pathways to the aquatic and human population, following a study using the various Sandia models discussed herein or equivalent, should be conducted for the Shoreham site. The supplemental responses to the specific interrogatories are as follows:

B.1: Refer to general description in the preceding for a general discussion of the path followed by liquids and dissolved radioactive contaminants released from a nuclear plant during an accident. In general, radioactivity can be released directly to the hydrosphere after a core-melt accident as a result of

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* Sandia Study (Draft), pages 6-16 and 6-17.

leaching of the core-melt debris, escape of sumpwater, and depressurization of the containment atmosphere. Most of the long-lived isotopes, including the actinides, are expected to be found primarily in the melt debris. Therefore, even though this release occurs relatively slowly, the impact for a soil site such as Shoreham can still be significant.

B.2: The emergency action level guidelines described in NUREG-0654 for the Ingestion Pathway, including the guidance on size of the EPZ appear to be derived from WASH-1400 and, thus, results in inadequate assessment of radioactive releases through the liquid pathway.*

B.3: Yes.

B.4: The NRC regulations which require consideration of hypothetical Shoreham releases through the liquid pathway include 10 CFR 50, Appendix E, 10 CFR 50.34(b), 10 CFR 50.33, 10 CFR 50.47, and 10 CFR 50.54 for the basis as described in the preceding.

B.5 and B.6: The facts and documents on which SOC now relies are described in detail in the general response to this interrogatory. The facts and documents on which SOC expects to rely** during the Shoreham hearings will include the preceding as supplemented by facts and documents provided by LILCO and the NRC on this docket in the future, and by facts and documents provided by LILCO and the NRC in response to any forthcoming SOC discovery request and/or interrogatories.

B.7: The documents on which SOC now relies are described in the foregoing. Since the documents are publically available, no copies have been provided by SOC.

B.8, B.9, and B.10: SOC has not yet decided which witnesses it will utilize in the hearings. When this decision is made the response to these interrogatories

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* NUREG-0554, pages 13 to 18 and Appendix 1.
**To the extent they are now known.

will be supplemented with the requested information. To the extent that SOC's present consultants are assisting in reviewing and/or responding to these interrogatories, their resumes are attached hereto.

B.11 and B.12: SOC first engaged the services of their consultants, MHB Technical Associates, in December, 1979, and has had a continuing discussion with them regarding the contentions in this case. However, as of this writing, the consultants have not made any reports to SOC related to this contention. General studies or observations that SOC now relies or expects to rely on during the Shoreham hearing are set forth in the preceding. Also, see response to B.5 and B.6.