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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-OL-3
) (Emergency Planning)
) (Hospital Evacuation Time
) Estimates)

TESTIMONY OF DIANE P. DREIKORN AND
EDWARD B. LIEBERMAN ON THE REMANDED ISSUE
OF THE BASES AND ACCURACY OF LILCO's
HOSPITAL EVACUATION TIME ESTIMATES

HUNTON & WILLIAMS
707 East Main Street
P. O. Box 1535
Richmond, Virginia 23219

April 13, 1988

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IDENTITY AND QUALIFICATIONS OF WITNESSES

1. Q. Please state your name and business address.

A. [Dreikorn] My name is Diane P. Dreikorn. My business address is Long Island Lighting Company, 131 Hoffman Lane, Central Islip, New York 11722.

[Lieberman] My name is Edward B. Lieberman. My business address is KLD Associates, Incorporated, 300 Broadway, Huntington Station, New York 11746.

2. Q. Please summarize your professional qualifications and your role in determining LILCO's hospital evacuation time estimates for the Shoreham Nuclear Power Station.

A. [Dreikorn] I am Supervisor of Offsite Plans and Facilities for the Long Island Lighting Company. My professional qualifications are being offered into evidence as Attachment A to this testimony. I am participating on this panel as the LILCO representative to describe why LILCO calculated the hospital evacuation time estimates and the process by which we accomplished this goal. I supervise the development of the Local Offsite Radiological Emergency Response Plan for Shoreham (the LILCO Plan). My familiarity with LILCO's hospital evacuation time estimates is based upon my involvement in and review of portions of Revision 9 to the LILCO Plan dealing with hospital evacuation and reception hospitals.

[Lieberman] I am President of KLD Associates, Incorporated. My professional qualifications are Attachment B to this testimony. Previously, KLD Associates performed work for LILCO on evacuation time estimates for the general population and special facilities for the Shoreham EPZ. Recently, I assisted LILCO in applying the methodology and extending the assumptions used in determining the ETes for special facilities to include hospitals, and coordinating and reviewing the calculations of the hospital evacuation time estimates.

SCOPE OF TESTIMONY

3. Q. Please summarize the scope of this testimony.

A. [Dreikorn, Lieberman] This testimony will focus on the issues regarding hospital evacuation time estimates as framed by the Board in its February 24, 1988 Memorandum and Order Ruling on LILCO's Motion for Summary Disposition of the Hospital Evacuation Issue at page 12. Specifically, the Board ordered evidentiary hearings on "the accuracy and bases of the evacuation time estimates presented in Revision 9 to LILCO's Plan." There are three hospitals at issue in this proceeding. Two (The John T. Mather Memorial and St. Charles Hospitals) are located just inside the 10-mile boundary, and the third (Central Suffolk Hospital) is just outside the 10-mile emergency planning zone (EPZ). LBP-85-12, 21 NRC 64, 829, 846 (1985) ("PID"); LILCO Test. Cont. 24.J, N, 72.C, D, and 96.B (Planning for Special Facilities), ff. Tr. 9017, Vol. II, at 12, 14, 26, Attachment 73.

LILCO'S HOSPITAL EVACUATION TIME ESTIMATES

4. Q. What is the purpose of determining evacuation time estimates for hospitals?
- A. [Dreikorn, Lieberman] These estimates of evacuation time serve as a basis for a reasoned protective action recommendation to either shelter or evacuate one or more of these hospitals.
5. Q. Have estimates of the time required to evacuate these three hospitals been developed?
- A. [Lieberman] Yes. Details of this analysis and evacuation time estimates on a facility-by-facility basis are presented on pages IV-172 through IV-187 of Appendix A to the LILCO Plan. This section is Attachment C to this testimony. As explained in Attachment C, the priority of evacuation, which was previously litigated, is that the home-bound handicapped are evacuated first; the special facilities are evacuated next, followed by Suffolk Infirmary and the hospitals, using buses and the 63 ambulances and 130 ambulettes noted in the PID at 829-31. In the case where the entire EPZ is evacuated under normal (summer) weather conditions, the resulting time estimate to evacuate all three hospitals, assuming 100 percent occupancy of these hospitals, is 12.33 hours.

BASES AND ACCURACY OF LILCO'S HOSPITAL ETES

6. Q. Please explain how these evacuation time estimates for hospitals were developed.

- A. [Dreikorn] LILCO retained KLD Associates as consultants to define the procedures for developing evacuation time estimates for hospitals, to participate in the analysis effort, and to review the final results. The calculations were performed by personnel of consultants, including KLD.

[Lieberman] The calculation of evacuation time estimates for hospitals involved adapting and extending the method used to calculate ETEs for special facilities to include hospitals, and consisted of a series of discrete steps. These steps include:

(1) Updating Information, as necessary:

- Number, type, locations of all special facilities including the home-bound handicapped, health care facilities, nursing homes, schools for the handicapped, and the hospitals.
- Number, type, locations of all host facilities including monitoring centers, dispatch facilities, hospitals, and reception centers.
- Number and type of all emergency vehicles and their schedules of availability at the dispatch facilities.

(2) Stating Postulates:

- Estimates of travel speeds, stratified by route, by elapsed time relative to the start of evacuation, by direction of travel, by vehicle location, by weather condition, and by vehicle type.
- Estimates of driver processing time, passenger loading and unloading times, and monitoring times.
- Establishing sequence of evacuation activities, stratified by evacuating facility type and location.

(3) Developing Data Base:

- Estimating travel distances and delineating routes between evacuating facilities, the EPZ boundary, and host facilities, stratified by direction of travel.

(4) Performing Calculations:

- Selecting the sequence of facilities to be evacuated.

- Defining the "platoon" of vehicles (up to six in number) for each run (i.e., round trip), consistent with this sequence.
- Delineating the path of travel for each run and for each "platoon" of vehicles. This path identifies the starting point (e.g. dispatch facility), the route to the EPZ boundary, the route from the boundary to the selected facility to be evacuated within the EPZ, the route from this facility to the EPZ boundary, the route from the boundary to the first (if more than one) host facility, then to the final host facility which is usually the dispatch facility, to complete the run.
- Calculating the time of travel for each route segment, the times for loading and unloading passengers, any queuing delays associated with the loading/unloading activities, and time for briefing and reassignment.
- Estimating the starting time of each run based on vehicle availability.

- Establishing the identities of all vehicles which perform multiple runs.

(5) Summarizing Results:

- Establishing a schedule of all runs for three evacuation scenarios (see below).
- Identifying the elapsed times to evacuate the hospitals for three separate evacuation scenarios:
 - o Central Suffolk Hospital, only
 - o John T. Mather Memorial and St. Charles Hospitals, only
 - o All three hospitals, concurrently

7. Q. What did you use for guidance in developing the assumptions and the hospital evacuation time estimates?

A. [Lieberman] 10 C.F.R. Part 50, App. E and NUREG-0654, App. 4. We derived most of the assumptions from the ETEs for the general population and special facilities, including analyses conducted previously to respond to Contentions 72.A and E. It is conservatively assumed that the hospital occupancy is 100 percent at the time of evacuation.

8. Q. Please describe the bases of the hospital evacuation time estimates.

A. [Lieberman] All of the estimates which are postulated for LILCO's hospital evacuation time estimates are stated in Revision 9 of Appendix A to

the LILCO Plan. Most assumptions were contained in LILCO's Testimony on Contentions 72.A and E, ff. Tr. 9:01, and were discussed in the PID at pages 835-38. Certain of the previously litigated assumptions are clarified below:

Loading Vehicles at Evacuating Facilities:

- Ambulettes carry 7 people and can be loaded in 25 minutes for normal weather and 30 minutes for inclement weather. Ambulances carry 2 people and can be loaded in 20 minutes for normal weather and 30 minutes for inclement weather. Up to 6 ambulances and 6 ambulettes can be loaded simultaneously at a given facility. Residents of the facilities are ready for loading at time of vehicle arrival. LILCO Plan, App. A at IV-176.

Loading Buses at Evacuating Facilities:

- Buses carry a maximum of 40 adult passengers and can be loaded in 10 minutes. Up to 6 buses can be loaded simultaneously. Id. at IV-177.

The calculations of the evacuation time estimates for hospitals were formulated so that generally, vehicles were scheduled to arrive at the evacuating facilities so as to avoid or minimize queuing.

Another assumption stated in Appendix A is:

- All three hospitals receive vehicles concurrently as they become available. Id. at IV-178.

In the calculation of the hospital evacuation time estimates, vehicles were generally allocated to hospitals in proportion to the number of patients remaining to be evacuated at each hospital as vehicles became available for reassignment.

Another assumption stated in Appendix A is:

- After delivering evacuees to reception hospitals, the vehicle drivers are immediately available for additional trips, if necessary. Id. at IV-178.

In the calculation of the hospital evacuation time estimates, ambulances which may be needed for multiple trips were assigned to reception hospitals that, generally, were closer to the EPZ than the reception hospitals to which ambulettes and buses were assigned.

9. Q. Why did you select this methodology for calculating the ETES for hospitals?

A. [Lieberman] First, it is the same methodology employed previously and found to be appropriate for calculating ETES for special facilities PID at 835-38. Second, the methodology is a representation of the dynamic evacuation process and reasonably represents the vehicle movements along the inbound and outbound routes. Thus, this method is directly responsive to the guidelines of NUREG-0654, Rev. 1, Supp. 1 which states that "[t]ime estimates for evacuation of various sectors and distances [should be] based on a dynamic analysis." NUREG-0654, Rev. 1, Supp. 1, at 19.

10. Q. Revision 9 of Appendix A identifies various travel speed estimates for different hospital evacuation routes. Explain the bases for these estimates.

A. [Lieberman] As explained in my affidavit attached to LILCO's Motion for Summary Disposition of the Hospital Evacuation Issue (Dec. 18, 1987), most of the procedural steps and assumptions used in calculating the evacuation time estimates for hospitals are identical to those used

previously for calculating evacuation time estimates for the special facilities in the EPZ. Those evacuation time estimates, and the procedures and assumptions used in calculating them, have already been litigated in this proceeding. They were contained in LILCO's Testimony on Contentions 72.A and E., ff. Tr. 9101, and were discussed in the Licensing Board's Partial Initial Decision (PID), at pages 835-38. Most host facilities for the hospital evacuees are located throughout Nassau County and Western Suffolk County at distances considerably farther from the EPZ than the host facilities considered in prior litigation. For this reason, estimated travel speeds for areas west of the EPZ were modified to reflect the updated speeds used in LILCO's testimony in the reception centers remand proceeding. See, e.g., LILCO Exhibit 1 ("Written Testimony of Douglas M. Crocker, Dale E. Donaldson, Diane P. Dreikorn, Edward B. Lieberman, Roger E. Linnemann, Michael K. Lindell, Dennis S. Milet, and Richard J. Watts on the Suitability of Reception Centers"), ff. Tr. 17,421 at 7-8.

11. Q. What are the bases of the assumptions set forth at pages IV-176 through IV-178 of Appendix A of the LILCO Plan?

A. [Dreikorn, Lieberman] Except as noted below, the assumptions set forth in Appendix A were contained in LILCO's Testimony on Contentions 72.A and E, ff. Tr. 9101, and were discussed in the PID at pages 833-38. Except for the modifications involving travel speeds which were discussed above, two other assumptions have been modified since the prior litigation.

[Dreikorn] The assumption stated at p. IV-176 of Appendix A that the "time required for ambulance/ambulette drivers to receive dosimetry,

briefing and assignment at Brentwood/Peconic, is 30 minutes" differs from the previous estimate of 15 minutes for special facilities. Previously, drivers received dosimetry, briefing and assignment at one of three staging areas. Now, all ambulances and ambulettes, except those dispatched from Peconic, report to the EWDF in Brentwood. The revised estimate of 30 minutes is more representative of the duration of such activities at the EWDF, and is consistent with previous findings regarding the mobilization of LERO field workers. See PID at 725.

The assumption stated at p. IV-176 that "[m]onitoring time for the occupants for all vehicles is 15 minutes" is based upon observations of drills of LERO field workers involving monitoring people in vehicles.

12. Q. What is the starting point for the hospital evacuation time estimates?

A. [Lieberman] The starting point for the evacuation time estimates for the hospitals is when a protective action recommendation of evacuation is given. For the calculation of the hospital ETEs, this starting point includes the assumption, listed in Appendix A at p. IV-76, that ambulance and ambulette companies are notified to dispatch vehicles at the Site Area Emergency level and that the Site Area Emergency level precedes the order to evacuate by 25 minutes. These assumptions represent a rapidly escalating accident at the Shoreham Station which was used as the basis for all prior ETE studies.

Q. What is the ending point for the hospital evacuation time estimates?

- A. [Lieberman] The ending point for any hospital evacuation is when the last vehicle evacuating from the hospitals that are within the EPZ crosses the boundary of the EPZ. For Central Suffolk Hospital, which is outside the EPZ, the ending point is when the last vehicle evacuating from the hospital completes its loading.
14. Q. How did LILCO determine the schedule of availability of the types of vehicles (ambulances, ambulettes, buses) needed to evacuate the hospitals?
- A. [Lieberman] The schedule of availability of ambulances and ambulettes is based on data obtained from a survey of ambulance/ambulettes companies. PID at 828-31. This data was utilized in the original calculation of the special facility evacuation time estimates which was litigated four years ago. PID at 835-38. Using that schedule, we assumed a uniform vehicle arrival rate over each period of time for which vehicle availability data was provided.
- The availability of buses was also based on estimates previously developed for special facilities. PID at 817-22. Specifically, the few buses needed for hospital evacuation were assumed to be dispatched from the Patchogue staging area, 2 hours and 15 minutes after the site area emergency level is declared.
15. Q. How did you choose the routes assumed to be taken by vehicles evacuating patients from the three hospitals?
- A. [Lieberman] All routes outside the EPZ, and those inbound routes within the EPZ, were chosen on the bases that they follow major (numbered)

roads or collector roads and approximate minimum distance paths. Such selection also took into account the objective to limit the number of turns which would have to be negotiated by the vehicles. The outbound (evacuating) routes within the EPZ are those which are documented in Appendix A.

16. Q. What reception hospitals are assumed to be available in the calculation of the evacuation time estimates?

A. [Dreikorn] The reception hospitals assumed to be available as hosts for hospital evacuees are those listed in OPIP 3.6.5, Attachment 5 which is Attachment D to this testimony. This list of hospitals was drawn from the list of hospitals capable of treating contaminated/injured individuals. OPIP 4.2.2., Attachment 1. All host hospitals are at least 5 miles outside the EPZ boundary.

17. Q. Are you aware of any changes of fact since Revision 9 that might affect the results just described?

A. [Dreikorn, Lieberman] Yes. During the course of the continuing planning process, LILCO has identified, since Revision 9, certain additional facilities not accounted for in Rev. 9. Updated evacuation time estimates for the hospitals will be included in a future update to the LILCO Plan. The LILCO Plan requires an annual review and updating of the Plan and its provisions. OPIP 5.4.1, "Document Control."

18. Q. Does this conclude your testimony?

A. [Dreikorn, Lieberman] Yes.

ATTACHMENT A

DIANE PALLAS DREIKORN
70 Eaton's Neck Road
Northport, New York 11768
Telephone: 516/754-4162

EDUCATION: Rochester Institute of Technology, Rochester, New York
Major: Physics (Nuclear Medicine)
Degree: Bachelor of Science Cum Laude, June 1976

State University of New York, Agricultural and Technical College
Alfred, New York
Major: Medical Lab Technology
Degree: Applied Associate of Science, June 1974

ADDITIONAL
TRAINING:

Health Physics & Radiation Protection - 5 Weeks - (February
March 1985 - Oak Ridge Associated Universities,
Oak Ridge, TN

Advanced Health Physics Topics (November 1984)
- Oak Ridge Associated Universities, Oak Ridge, TN

Biological Effects of Ionizing Radiation (October
1985) - Harvard School of Public Health, Boston, MA

Teletherapy Calibration (June 1984) - M.D. Anderson
Hospital, Houston, TX

Inspection Procedures (July 1982) - U.S. Nuclear
Regulatory Commission

Medical Accelerator Course (April 1982) - New York
State Health Department

Radiation Accident Assessment (November 1981) -
Federal Emergency Management Agency

Licensing of Radioactive Material (September 1981) -
U.S. Nuclear Regulatory Commission

Medical Use of Radioisotopes (May 1981) - U.S.
Nuclear Regulatory Commission

WORK EXPERIENCE:

2/87 to present Long Island Lighting Company
175 E. Old Country Road
Hicksville, New York 11801

Supervisor, Offsite Plans and Facilities (12/87 - present)

Duties: Supervise staff of approximately fifteen personnel in two functional groups to ensure maintenance of facilities and equipment to minimize equipment-related problems during drills and a FEMA-evaluated exercise, and maintenance of offsite emergency plans/procedures to satisfy FEMA and NRC requirements, maintain qualifications as a LERO Radiation Health Coordinator, provide litigation technical support, and function as company liaison on radiological issues to governmental agencies and medical facilities.

Senior Emergency Planner (2/87-12/87)

Duties: Assist in the development and maintenance of the onsite and offsite emergency preparedness program for the Shoreham Nuclear Power Station to ensure compliance with 10 CFR 50, NUREG-0396, NUREG-0654 and FEMA Guidance Memoranda, present emergency plan training on health physics related topics to members of the onsite and offsite emergency organization, act as company liaison with offsite medical facilities to secure letters of agreement and provide training for handling injured/contaminated members of the general public, serve in the capacity of Radiological Health Coordinator in the offsite emergency organization, performing dose projections and protective action recommendations, provide litigation support on radiological issues, and serve as an observer/controller for drills/exercises of the emergency plan and procedures.

10/85-2/87

Impell Corporation/Radiological Services
225 Broad Hollow Road
Melville, New York 11747

Senior Engineer

Duties: Provide consulting services to the nuclear power industry, conduct training sessions in radiological emergency preparedness for onsite and offsite organizations, perform audits of nuclear power electric generating plant radioactive material package and transport procedures and radioactive waste handling to determine compliance with 10 CFR and 49 CFR, and perform audits of onsite and offsite emergency preparedness procedures to determine compliance with NUREG-0654.

2/81-10/85

New York State Health Department
Bureau of Environmental Radiation Protection
Albany, New York 12237

Principal Radiological Health Specialist (10/34-10/85)

Duties: Responsible for the administration of the U.S. Nuclear Regulatory Commission (NRC)/ New York State Department of Health (NYSDOH) Agreement Program for licensing and compliance of radioactive materials use in medical and academic facilities, maintain compatibility between NRC regulations and NYSDOH Sanitary Code, coordinate response to radiological

emergencies and incident investigations through five regional offices, and provide technical support for emergency exercises involving nuclear power reactors.

Associate Radiological Health Specialist (4/83-9/84)

Duties: Reviewed and approved radioactive material license applications and amendment requests for limited and broad-scope programs, reviewed Investigational New Drug research protocols for completeness and coordinated review by Department's Radiological Health Advisory Committee members, reviewed proposed changes to NRC regulations and recommended Department reaction, proposed changes to NYSDOH Sanitary code to maintain compatibility with NRC regulations, provided assistance to regional personnel for inspection of complex licenses.

Senior Radiological Health Specialist (2/81-4/83)

Duties: Reviewed and recommended for approval radioactive materials license applications and amendments for medical and academic facilities with limited-scope programs, reviewed research protocols for Investigational New Drug usage for completeness, conducted inspections of limited-scope programs to assure compliance with NYSDOH Sanitary Code.

3/80-5/80

New York State Education Department
Bureau of Health Occupations Education
Albany, New York 12230

Consultant - Designed curriculum guidelines for a nuclear medicine apprenticeship program.

9/77-2/81

Nuclear Medicine Technologist

Various Medical Centers in New York State.

**PROFESSIONAL
AFFILIATIONS:**

American Nuclear Society
Long Island Chapter

Health Physics Society
Northeastern New York Chapter

American Association of Physicists in Medicine
Upstate New York Chapter

ATTACHMENT B

PROFESSIONAL QUALIFICATIONS

EDWARD LIEBERMAN
President
KLD ASSOCIATES, LTD.

My name is Edward Lieberman and my business address is KLD Associates, Inc. 300 Broadway, Huntington Station, New York 11746. I am presently President of KLD Associates, Inc.

I received the Bachelor of Science degrees in Civil Engineering in 1951 from Polytechnic Institute of Brooklyn. I was granted the Master of Science degrees in Civil Engineering in 1954 from Columbia University and in Aero Engineering in 1967 from Polytechnic Institute of Brooklyn. I am currently working on a Doctorate degree in Transportation Planning at Polytechnic University. I am a member of Chi Epsilon Honorary Fraternity.

With over 20 years of professional experience, I have managed numerous major projects. I pioneered the development and application of traffic simulation models, making major innovations in the state-of-the-art in the Traffic Engineering profession. I have also been responsible for many engineering studies involving data collection, analysis, and design of traffic control systems to expedite traffic flow and relieve congestion.

I have developed simulation models to study traffic performance on urban networks, freeways, freeway corridors, and two-way rural roads. These programs include consideration of pedestrians' interacting with vehicular traffic, truck and bus operations, special turning lanes, and vehicle fuel consumption and emissions; both pretimed and actuated traffic signal controls are represented.

I was responsible to a large extent for the theoretical development of DYNEV, a Dynamic Network Evacuation model. The DYNEV model consists of two major

components: an equilibrium traffic assignment model and a macroscopic dynamic traffic simulation model designed for all types of roadway facilities (urban streets, freeways, rural roads).

DYNEV is designed to be used as a tool to assist in the development and organization of evacuation plans needed as part of general disaster preparedness planning, and for calculating evacuation routes and estimated evacuation travel time. DYNEV was used to analyze an existing evacuation scenario at the Con Edison Indian Point Nuclear Power Station and was used to develop an extensive evacuation plan for the LILCO Shoreham Nuclear Power Station on Long Island, New York.

Under contract with the Federal Emergency Management Agency (FEMA), I managed a project which extended and enhanced the DYNEV model, leading to the development of IDYNEV, which is a major model component of FEMA's Integrated Emergency Management Information System (IEMIS). The IDYNEV model has been extended to accommodate regional evacuation studies for hurricanes and other large scale emergencies. It is currently being extended to incorporate an integrated trip distribution and assignment model which will increase effectiveness and ease of use. This extension includes a new formulation and software which I developed.

In developing the evacuation plan for LILCO's Shoreham Nuclear Power Station, my activities included definition of evacuation scenarios, definition of the evacuation network, development of traffic control treatments and of traffic routing patterns, analysis of trip tables, analysis of simulation results, evaluation of evacuation strategies and the preparation of formal documentation. This effort included the development of evacuation time estimates (ETEs) for special facilities. Recently, the methodology was extended to include the calculation of ETEs for hospitals.

I was also responsible for the designs of the NETSIM microscopic urban traffic simulation model (formerly UTCS-1) and of the SCOT freeway traffic simulation model. The NETSIM microscopic traffic simulation model, developed for the Federal Highway Administration, enables agencies to evaluate traffic operations in urban environments. The SCOT model was developed for the Transportation Systems Center of the Department of Transportation. This program includes a dynamic traffic assignment algorithm which routes traffic over a network in response to changing traffic flow characteristics to satisfy a specified origin-destination table. In addition, I have developed advanced traffic control policies for urban traffic for the FHWA-sponsored UTCS Project, as well as a bus preemption policy to enhance the performance of mass transit operations within urban environs.

I designed and programmed the advanced "Third generation" area-wide, cycle-free control policies for moderate and congested traffic flow for computer-monitored real-time systems. I also developed a cycle-based, off-line computational procedure named SIGOP-II to optimize traffic signal timing patterns to minimize system "disutility."

I led a group of traffic engineers and systems analysts in developing a system of macroscopic traffic simulation models designed to evaluate Transportation Systems Management (TSM) strategies. This software system, named TRAFLO, consists of three macroscopic traffic simulation models named NEJFLO I, II, III, and includes an equilibrium traffic assignment model named TRAFFIC and a queue-theoretic intersection capacity model. This model has been distributed to other agencies including FEMA.

I designed an "Integrated Traffic Simulation System," named TRAF, which incorporates the best traffic simulation models available. Using structured programming techniques, TRAF integrates: NETSIM and TRAFLO.

I served as Principal Investigator on NCHRP Project 3-20 entitled, "Traffic Signal Warrants." This project involved both field data collection and the application of the NETSIM model to study intersection delay as a function of traffic volume, type of control, and geometrics. In turn, I developed and documented new signal warrants, some of which will be incorporated in the next version of the Manual on Uniform Traffic Control Devices (MUTCD).

Under NHTSA sponsorship, I directed a research study to evaluate a Driver Vehicle Evaluation Model named DRIVEM. This model simulates the response of motorists to hazardous events. The effort included analysis of the model formulation and software and sensitivity testing. A workshop was designed, organized, scheduled, and conducted by myself and other KLD professionals; experts from all over the U.S. were invited to recommend specific NHTSA research activities for the further development of the model. A recommended research program constituted the major output of the contract.

I supervised several studies performed by KLD in connection with developing evacuation plans and ETEs for other nuclear power stations including GINNA, Davis Besse, Pilgrim, and Seabrook.

I am currently Principal Investigator on two projects: (1) to explore the feasibility of applying Artificial Intelligence (AI) to address the problems of congested corridors for FHWA and (2) to develop traffic control strategies for oversaturated networks for NCHRP.

Over the years I have been involved in a number of other studies to evaluate traffic operations on large-scale road networks, using one or more of the models described above.

Prior to 1968 I applied my skills to the areas of stress analysis, vibrations, fluid dynamics, and numerical analysis of the differential equations. These analyses were programmed for the IBM 7090 and System 360, CDC 6600 and 7600, G.E. 625 and UNIVAC 1108 digital computers in assembly language, FORTRAN and PLI. I also designed the logic and real-time programming for a sonar simulator built for the Department of Navy and monitored by a PDP-8 process-control digital computer.

I am a member of the American Society of Civil Engineers, the Institute of Transportation Engineers, the Association of Computing Machinery and the Transportation Research Board (TRB). I am also a member of the Traffic Flow Theory and Characteristics Committee of the TRB. I am a licensed Professional Engineer in New York, Maryland, and Florida.

The following list comprises selected publications of my studies and findings:

"DYNET - A Dynamic Network Simulation of Urban Traffic Flow," Proceedings, Third Annual Simulation Symposium, 1970.

"Simulation of Traffic Flow at Signalized Intersections: The SURF System," Proceedings, 1970 Summer Computer Simulation Conference, 1970.

"Dynamic Analysis of Freeway Corridor Traffic," ASME paper, Trans. 70-42.

"Simulation of Corridor Traffic: The SCOT Model," "Highway Research Record No. 409, 1972.

"Logical Design and Demonstration of UTCS-1 Network Simulation Model," Highway Research Record No. 409, 1972 (with R.D. Worrall and J.M. Bruggerman).

"Variable Cycle Signal Timing Program: Volumes 1-4," Final Report of Contract DOT-FH-11-7924, June, 1974.

"Traffic Signal Warrants," KLD TR-51, Final Report on NCHRP Project 3-20/1, December 1976 (with G.F. King and R. Goldblatt).

"Rapid Signal Transition Algorithm," Transportation Research Record No. 509, 1974 (with D. Wicks).

"Subnetwork Structuring and Interfacing for UTCS Project-Program of Simulation Studies," KLD TR-5, January, 1972.

"Development of a Bus Signal Preemption Policy and a System Analysis of Bus Operations," KLD TR-11, April, 1973.

"SIGOP-II - Program to Calculate Optimal, Cycle-Based Traffic Signal Timing Patterns, Volumes 1 and 2," Final Report, Contract DOT-FH-11-7924, KLD TR-29 and TR-30, December 1974. Summary report in Transportation Research Record 596, 1976 (with J. Woo).

"Developing a Predictor for Highly Responsive System-Based Control," Transportation Research Record 596, 1976 (with W. McShane and R. Goldblatt).

"A New Approach for Specifying Delay-Based Traffic Signal Warrants," Transportation Research Special Report 153 - Better Use of Existing Transportation Facilities, 1976.

"Network Flow Simulation for Urban Traffic Control Systems," Vols. 1-5, PB230-760, PB230-761, PB230-762, PB230-763, PB230-764, 1974 (with R. Worrall). Vols. 2-4 updated 1977, KLD TR-60, TR-61, TR-62 (with D. Wicks and J. Woo).

"Extension of the UTCS-1 Traffic Simulation Program to Incorporate Computation of Vehicular Fuel Consumption and Emissions," KLD TR-63, 1976 (with N. Rosenfield).

"Analysis and Comparison of the UTCS Second and Third-Generation Predictor Models," KLD TR-35, 1975.

"Urban Traffic Control System (UTCS) Third Generation Control (3-GC) Policy," Vol. 1, 1976 (with A. Liff).

"Design of TRAFIC Operating System (TOS), KLD TR-57, 1977.

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ATTACHMENT C

Hospitals

There are three hospitals located at the edge of the Shoreham 10 mile Emergency Planning Zone (EPZ): John T. Mather Memorial Hospital, St. Charles Hospital and Central Suffolk Hospital. Two of the hospitals are located at 10 miles with the third located just outside the EPZ at 10 and one-quarter miles from the plant. Due to their distance from the plant, the high shielding factors these facilities provide, and the risks of evacuating their patients, sheltering will normally be the preferable protective action in the event of an emergency at the SNPS. It is possible, however, under certain circumstances that evacuation may be required for any of these hospitals. If evacuation is recommended, LERO will evacuate these facilities using the transportation resources available after the general population and other special facilities have been evacuated. Priority will be given to evacuation of radiosensitive patients (maternity, newborns, pediatrics).

Upon declaration of any ALERT or higher emergency classification, the hospitals will be notified, by their tone alert radios and apprised of the situation at the plant via WPLR-FM broadcasted EBS messages. Each hospital has been issued a tone alert receiver which silently monitors the radio WPLR-FM frequency. When WPLR generates its EBS signal, these units will automatically activate and transmit the message being broadcast over the air. This message contains general information about the status of the plant and may contain specific instructions for the hospitals.

Should sheltering be the recommended protective action for the hospitals, the Health Facilities Coordinator will notify, by telephone, each of the hospitals to verify that they heard the EBS message and are implementing their sheltering plans which include having patients either remain in place or relocate within the hospital.

Although it is anticipated that sheltering will be the primary protective action recommended, an evacuation strategy has been developed for Mather, St. Charles and/or Central Suffolk Hospitals. If evacuation is recommended, the Health Facilities Coordinator will notify each hospital of the recommendation. Upon notification each hospital will determine their transportation requirements and forward this information to the Health Facilities Coordinator. Priority will be given to evacuation of radiosensitive patients.

Arrangements for the resources needed to transport patients will be made by the Transportation Support Coordinator and Ambulance Coordinator. The sources of these vehicles will be the companies who are supplying vehicles for the evacuation of other segments of the population. These vehicles will be supplied on an as available basis as the rest of the affected population evacuation nears completion. Should evacuation be implemented for John T. Mather Memorial Hospital, St. Charles Hospital and/or Central Suffolk Hospitals, the patients will be relocated to hospitals outside the EPZ.

Nursing/Adult Homes

Upon declaration of any Alert or higher emergency classification, all nursing/adult homes will be notified by their tone alert radios and apprised of the situation at the plant via WPLR-FM broadcasted EBS messages.

Sheltering or evacuation may be the recommended protective action for nursing/adult homes. If sheltering is recommended, the Health Facilities Coordinator will notify by telephone each affected facility to verify that the facility received the EBS message and is implementing their sheltering procedure.

If evacuation of nursing/adult homes is recommended, the predetermined vehicles will be dispatched to the facilities. In addition, the Health Facilities Coordinator will contact each facility by telephone, verify that the facility received the EBS message, and verify their transportation requirements.

Due to the Suffolk Infirmary's distance from Shoreham, building construction and risks associated with evacuation, sheltering will be the primary protective action. As it is with the hospitals, if evacuation is recommended, transportation will be provided using transportation resources available after the general public and other special facilities are evacuated.

Also included with this table is an estimate of the transport requirements for the non-ambulatory general population.

Because of the number of nursing home patients and the specialized care and facilities some of them require, it was felt that the public Reception Centers were not adequate for all their needs. Therefore, some nursing/adult home patients will be sent to special pre-designated reception centers.

Facility	Residents			Vehicles Required			
	Ambulatory		Non-Ambulatory	Buses	Ambulances	Ambulettes	Vans
	Buses	Ambulettes	Ambulances				
Oak Hollow Nursing Center/Crest Hall Health Related Facility	53	211	20	2	10	31	2
Millcrest Adult Home	16	0	0	1	0	0	0
Our Lady of Perpetual Help Convent	15	4	1	1	1	1	0
Ridge Rest Home	58	0	0	2	0	0	0
Riverhead Nursing Home and Health Related Facility	60	119	2	2	1	17	0
Suffolk Infirmary	27	58	130	1	65	9	0
Sunrest Health Facilities, Inc.	27	162	18	1	9	23	0
Woodhaven Nursing Home and Home for Adults	114	207	3	3	2	30	2
Totals				13	88	111	2

Note: Ambulettes are assumed to carry 7 passengers. Ambulances are assumed to carry 2 passengers. Buses are standard 40 passenger vehicles. Vans are for transporting equipment.

Special Facility Evacuation Time Estimates

Assumptions:

Ambulances and Ambulettes

- Ambulance and Ambulette Companies are notified to dispatch vehicles at the Site Area Emergency level. The Site Area Emergency level is assumed to precede the order to evacuate by 25 minutes.
- Ambulances and Ambulettes arrive at LILCO Brentwood or Peconic Ambulance over a time interval which varies from 15 minutes to 5 hours after notification. An arrival distribution is based on information provided by the ambulance/ambulette companies. The distribution used to calculate these evacuation time estimates (ETE) reflects the slower response times for off peak hours.
- The time required for ambulance/ambulette drivers to receive dosimetry, briefing and assignment at Brentwood/Peconic, is 30 minutes.
- Travel to assigned facilities is at travel speeds listed in Table XIIIIB.
- Loading Vehicles at Facility:

Ambulettes carry 7 people and can be loaded in 25 minutes for normal weather and 30 minutes for inclement weather. Ambulances carry 2 people and can be loaded in 20 minutes for normal weather and 30 minutes for inclement weather. Up to 6 ambulances and 6 ambulettes can be loaded simultaneously at a given facility. Residents of the facilities are ready for loading at time of vehicle arrival.
- Travel from the facility to the EPZ boundary is along the facility's zone evacuation route at the speeds listed in Table XIIIIB.
- Travel from the EPZ Boundary to the designated monitoring facility is at speeds indicated in Table XIIIIB.
- Monitoring time for the occupants for all vehicles is 15 minutes.
- Travel from the monitoring facility to a designated reception center is at speeds indicated in Table XIIIIB.
- Unloading at Reception Center takes the same amount of time as loading the vehicles at the facility (see above).

- Drivers return to Brentwood for reassignment at speeds indicated in Table XIIIIB.
- Reassignment at Brentwood takes 15 minutes.
- Adverse winter ETE's are 6.25% longer than adverse summer ETE's. While the difference in travel times is greater than 6.25%, loading time and queuing time at facilities is assumed to be unaffected by weather. 6.25% for winter vs. summer adverse is computed as follows: $0.75/0.8 = 0.9375$ or 6.25% reduction, where (0.75, 0.8) is capacity/speed reduction factor for (rain, snow).

Buses

- LERO bus drivers (not including LERO School Bus Drivers) are notified to report at the Site Area Emergency Level. It is assumed that they leave the Patchogue Staging Area with a bus 2.25 hours after notification.
- Travel from Patchogue to the special facility is at travel speeds indicated in Table XIIIIB.
- Loading buses at facility:
Buses carry a maximum of 40 adult passengers and can be loaded in 10 minutes. Up to 6 buses can be loaded simultaneously.
- Travel to the EPZ boundary along the facility's zone evacuation route takes place at the travel speeds indicated in Table XIIIIB.

Homebound Handicapped

Ambulances and Ambulettes:

It is necessary to calculate the travel times for homebound pick-ups because they effect subsequent vehicle availability for the special facilities. The same assumptions apply as for Special Facility Ambulances/Ambulettes except as follows:

- Travel to homebound pick-ups: Vehicles travel from origination location to EPZ boundary at speeds listed in Table XIIIIB. Trips originating to the west of the EPZ travel 10 miles from the EPZ boundary to the first pick-up at inbound travel speeds. Trips originating from Peconic Ambulance travel 5 miles at inbound speeds and 5 miles at evacuation traffic speeds.
- Ambulances carry 2 passengers. Loading takes 10 minutes per person for normal weather and 15 minutes per person for inclement weather.

Ambulettes carry 4 passengers. (Although ambulettes can carry 7 passengers, homebound pick-ups were limited to 4 to reduce pick-up time). Loading takes 10 minutes per person for normal weather and 15 minutes per person for inclement weather.

- Travel between pick-ups is 15 minutes for normal weather and 20 minutes for inclement weather.
- Travel from last pick-up to EPZ boundary is for a distance of 8 miles at evacuation travel speeds listed in Table XIIIIB.
- Homebound Handicapped are taken directly to the closest useable reception hospitals. Evacuees are monitored inside the reception hospital; no delay is incurred by the ambulance/ambulette driver.
- Homebound handicapped have first priority to available vehicles.

Suffolk Infirmary and Hospitals

- Priority of evacuation is as follows:

Homebound handicapped are evacuated first. Then, those in special facilities, ordered by proximity to Shoreham, are evacuated next. Suffolk Infirmary is then evacuated, followed by the three hospitals. All three hospitals receive vehicles concurrently as they become available.
- The Suffolk Infirmary and the Hospitals evacuate patients to reception hospitals. Reception hospitals are a minimum of 5 miles from the EPZ boundary and are capable of accommodating contaminated personnel. Each reception hospital is assumed to have 14 percent of its total capacity available for homebound handicapped, infirmary and hospital evacuees.
- After delivering evacuees to reception hospitals, the vehicle drivers are immediately available for additional trips, if necessary.
- Vehicles will shuttle evacuees from the hospital facilities to the reception hospitals without being reassigned at Brentwood between trips. When all such pick-ups have been completed the vehicles will return to Brentwood for reassignment.
- All travel speeds are listed in Table XIIIIB.

Special Facilities evacuating using their own vehicles

The same assumptions apply as for special facilities evacuated by LERO vehicles except as follows:

- All of the facilities are ready to start loading vehicles 2 hours after the evacuation recommendation.
- These vehicles are not reused after their first evacuation trip.

Special Facility Evacuation Time Estimates (ETE)

Table XIII A summarizes the evacuation time estimates for the special facilities. For each facility, the table presents:

- o Zone in which facility is located.
- o Transport requirements based on the patient inventory.
- o Assigned monitoring and reception centers.
- o Time, hours and minutes, that the last vehicle leaves the EPZ, referenced to the evacuation recommendation. Estimates are given for normal and adverse weather.

School Evacuation Time Estimates

Assumptions:

- Bus Drivers arrive at assigned bus yards in a uniform distribution from 1 to 2.5 hours after notification.
- Notification for bus drivers to report occurs at the Site Area Emergency Level which precedes the evacuation recommendation by 25 minutes.
- Accessing a bus and obtaining the dosimetry/assignment packet at bus yards takes 20 minutes.
- Travel to school from bus company takes place at travel speeds listed in Table XIII B.
- Total number of students requiring buses:

Reduce school enrollments by 5% to account for absences. (use 1/2 enrollment for schools on split session, if applicable). Reduce high school population by 20% to account for students who drive to school and students that ride with them.

- Loading Students:

Buses carry 40 high school students or 60 Elementary/Other students.

Loading a bus takes 10 minutes and a maximum of 6 buses can be loaded simultaneously.

- Travel from the school to the EPZ Boundary along the appropriate zone's evacuation route takes place at speeds listed in Table XIIIB.

- Bus assignment reflects evacuation priority of schools based on proximity to Shoreham Power Station with closer schools having a higher priority. Nursery and elementary schools have a higher priority than other schools at the same distance from Shoreham.

Table XIIIC summarizes the evacuation time estimates for schools. For each school, the table presents:

- o Zone in which the school is located
- o Number of students enrolled in the school
- o Number of students requiring transport
- o Number of buses required for one wave evacuation
- o Bus companies where vehicles are obtained
- o Time, hours and minutes for each school's last bus to leave the EPZ. Estimates are given for normal and adverse weather conditions and are referenced to the evacuation recommendation.

Transit Operation

All transit operations are described in OPIP's 3.6.4 and 3.6.5.

Gasoline Contingency Plan

LILCO fuel tank trucks capable of refueling vehicles will be dispatched to locations along evacuation routes. These trucks will service evacuees vehicles which require gas, by providing a maximum of three gallons of fuel to assure passage out of the 10-mile EPZ.

TABLE XIII

EVACUATION TIME ESTIMATES FOR SPECIAL FACILITIES

FACILITY	ADDRESS	ZONE	VEHICLES FOR EVACUATION		MONITORING CENTER	RECEPTION CENTER	EVACUATION TIME ESTIMATE		
			FACILITY OWNED	LEO			NORMAL WEATHER	INCLEMENT WEATHER	WINTER
Little Flower Children Services ICF	Northside Road Wading River, N.Y. 11792	E	2 Vans		LILCO - Brentwood	LILCO - Babylon	4:54	5:29	5:49
Little Flower Children Services Institution	North Wading River Road Wading River, N.Y. 11792	E	4 Vans	2 Buses	LILCO - Brentwood	LILCO - Babylon	5:04	6:01	6:22
AHRC Robert Sansone Intermediate Care Facility	2 Defense Hill Road Shoreham, N.Y. 11786	A	4 Busettes	1 Bus	LILCO - Brentwood	AHRC -Bohemia	4:40	5:13	5:33
Preschoolers Place for Learning	Route 25A Wading River (North Shore Methodist Church)	C		1 Bus	LILCO - Brentwood	LILCO - Melville	4:52	5:24	5:44
Ridge Rest Home	P.O. Box 460 Whiskey Road Ridge, N.Y. 11961	G		2 Buses	LILCO - Brentwood	LILCO - Melville	4:10	4:36	4:53
UCP, Hostel Residence, Ridge	442 Randall Road Ridge, N.Y. 11961	G	Transp. Avail.		LILCO - Brentwood	UCP 4 Media Lane Stony Brook	3:34	3:52	4:07
Ridge SOLCF	64 Ridge Road Ridge, N.Y. 11961	G	Some Transp. Avail.	1 Bus 3 Ambulettes	LILCO - Brentwood	Long Island Developmental Center 133 Carmans Rd. Melville, N.Y.	3:52	4:19	4:35
Maryhaven, Residence/ Training House	179 Lower Rocky Point Road Rocky Point, N.Y. 11778	F	Transp. Avail.		LILCO - Brentwood	LILCO - Melville	3:06	3:17	3:29
Our Lady of Perpetual Help	Hilltop Drive Sound Beach, N.Y. 11789	F		1 Bus 1 Ambulette 1 Ambulance	LILCO - Patchogue	LILCO - Patchogue	3:38	4:02	4:18

TABLE XIII A
EVACUATION TIME ESTIMATES FOR SPECIAL FACILITIES
(Continued)

FACILITY	ADDRESS	ZONE	VEHICLES FOR EVACUATION		MONITORING CENTER	RECEPTION CENTER	EVACUATION TIME ESTIMATE		
			FACILITY OWNED	LEAD			NORMAL WEATHER	INCLEMENT WEATHER	
								SUMMER	WINTER
Options for Community Living	126 Tangier Drive Sound Beach, N.Y. 11789	F	Transp. Avail.		LILCO - Brentwood	LILCO - Babylon	2:52	3:01	3:12
Oak Hollow/Crest Hall	Church Land & Oak Crest Avenue Middle Island, N.Y. 11953	K		2 Buses 10 Ambulances 31 Ambulettes	LILCO - Brentwood	La Salle Military Academy	4:44	5:37	5:58
Independent Group Home Living	P.O. Box 651 Longwood Road Middle Island, N.Y. 11953	M		2 Ambulettes	LILCO - Patchogue	IGHL Day Treatment Center East Moriches	3:08	3:38	3:52
Maryhaven Hostel II	77 Landing Road Miller Place, N.Y. 11764	F	Transp. Avail.		LILCO - Brentwood	LILCO - Melville	2:49	2:57	3:08
UCP, Hostel Residence	6 Hemlock Road Mt. Sinai, N.Y. 11766	K	Transp. Avail.		LILCO - Brentwood	UCP Residence 9 Acorn Road St. James, N.Y.	2:50	2:59	3:10
Independent Group Home Living	135A Woodland Avenue Manorville, N.Y. 11979	N	Transp. Avail.		LILCO - Patchogue	IGHL Day Treatment Center East Moriches	3:09	3:20	3:33
Independent Group Home Living	288 Chapman Boulevard Manorville, N.Y. 11949	O	Transp. Avail.		LILCO - Patchogue	IGHL Day Treatment Center East Moriches	3:43	4:01	4:16
Independent Group Home Living	133 West Shore Road Mt. Sinai	K	Transp. Avail.		LILCO - Patchogue	IGHL Day Treatment Center East Moriches	2:32	2:37	2:47
Gordon Heights SOICF	85 West Yaphank Road Coram, N.Y. 11727	L	Some Transp. Avail.	4 Ambulettes	LILCO - Brentwood	LILCO- 300 Wheeler Rd.	2:39	3:03	3:14

TABLE XIII A
EVACUATION TIME ESTIMATES FOR SPECIAL FACILITIES
(Continued)

FACILITY	ADDRESS	ZONE	VEHICLES FOR EVACUATION		MONITORING CENTER	RECEPTION CENTER	EVACUATION TIME ESTIMATE		
			FACILITY OWNED	LERO			NORMAL WEATHER	INCLEMENT WEATHER	
								SUMMER	WINTER
Maryhaven, Self Apartments	655 Belle Terre Road Port Jefferson, N.Y. 11777	Q	Transp. Avail.		LILCO - Brentwood	LILCO - Melville	2:20	2:22	2:30
AHRC Work Activities	1180 Old Country Road Riverhead, N.Y. 11901	P	Transp. Avail.		LILCO - Brentwood	AHRC Bohemia	2:25	2:28	2:37
Millcrest Adult Home	Mill Road Yaphank, N.Y. 11980	L		1 Bus	LILCO - Brentwood	LILCO - Melville	2:36	2:45	2:55
Riverhead Nursing Home	1146 Woodcrest Avenue Riverhead, N.Y. 11901	P		2 Buses 1 Ambulance 17 Ambulettes	LILCO - Riverhead	La Salle Military Academy	4:00	4:30	4:47
Woodhaven Nursing Home & Home for Adults	1360 Route 112 Port Jefferson Station N.Y. 11776	K		3 Buses 2 Ambulances 30 Ambulettes	LILCO - Patchogue	LILCO - Patchogue	5:04	5:40	6:01
	1350 Route 112 Port Jefferson Station N.Y. 11776								
Maryhaven ICF Facility	ICF Facility 450 Myrtle Avenue Port Jefferson, N.Y. 11777	Q	Some Transp. Avail.	2 Ambulettes	LILCO - Patchogue	LILCO - Patchogue	2:45	3:04	3:15
Maryhaven Day Residential School Port Jefferson	450 Myrtle Avenue Port Jefferson, N.Y. 11777	Q	Some Transp. Avail.	2 Buses	LILCO - Patchogue	LILCO - Patchogue	2:48	3:00	3:11
Maryhaven CSS Continuing Treatment, Riverhead	CSS Continuing Treatment 240 W.	S	Transp. Avail.		LILCO - Brentwood	LILCO - Melville	2:10	2:10	2:18

TABLE XIII A
EVACUATION TIME ESTIMATES FOR SPECIAL FACILITIES
(Continued)

FACILITY	ADDRESS	ZONE	VEHICLES FOR EVACUATION		MONITORING CENTER	RECEPTION CENTER	EVACUATION TIME ESTIMATE		
			FACILITY OWNED	LEAD			NORMAL WEATHER	INCLEMENT WEATHER	
								SUMMER	WINTER
Maryhaven Hostel IV	322 Thompson Street Port Jefferson, N.Y. 11777	Q	Transp. Avail.		LILCO - Brentwood	LILCO - Melville	2:20	2:22	2:30
Sunrest Health Facilities	70 North Country Road Port Jefferson, N.Y. 11777	Q		1 Bus 9 Ambulances 23 Ambulettes	LILCO - Brentwood	LILCO - Melville	5:14	5:34	5:55
Maryhaven Hostel III	279 Terryville Road Port Jefferson, N.Y. 11777	K	Transp. Avail.		LILCO - Brentwood	LILCO - Melville	2:31	2:35	2:44
AHRC, Community Residence	542 Roanoke Avenue Riverhead, N.Y. 11901	S	Transp. Avail.		LILCO - Brentwood	AHRC Bohemia	2:10	2:10	2:18
BOCES Learning Center	St. Charles Hospital 200 Belle Terre Road Port Jefferson, N.Y. 11777	Q	Transp. Avail.		LILCO - Brentwood	LILCO - 300 Wheeler Road	3:10	3:22	3:34
AHRC Community Residence	126 Lincoln Street Riverhead, N.Y. 11901	S	Transp. Avail.		LILCO - Brentwood	AHRC Bohemia	2:10	2:10	2:18
Timothy Hill Children Ranch	260 Middle Road Riverhead, N.Y. 11901	P	Transp. Avail.		LILCO - Brentwood	LILCO - 300 Wheeler Road	2:25	2:28	2:37
Suffolk Infirmary	Yaphank Avenue Yaphank	L		65 Ambulances 9 Ambulettes 1 Bus	Reception Hospitals	Reception Hospitals	8:47	11:34	12:17
Johr T. Mather Hospital	North Country Road Port Jefferson, N.Y. 11777	Q		2 Buses 17 Ambulettes 30 Ambulances	Reception Hospitals	Reception Hospitals	12:00	15:42	16:41

TABLE XIII A
EVACUATION TIME ESTIMATES FOR SPECIAL FACILITIES
(Continued)

FACILITY	ADDRESS	ZONE	VEHICLES FOR EVACUATION		MONITORING CENTER	RECEPTION CENTER	EVACUATION TIME ESTIMATE		
			FACILITY OWNED	LEO			NORMAL WEATHER	SUMMER	WINTER
Central Suffolk Hospital	1300 Roanoke Avenue Riverhead, N.Y. 11901	P		1 Bus 9 Ambulances 23 Ambulances	Reception Hospitals	Reception Hospitals	12:19	15:52	16:51
St. Charles Hospital	Belle Terre Road Port Jefferson, N.Y. 11777	Q		22 Ambulances 24 Ambulances 2 Buses	Reception Hospitals	Reception Hospitals	12:20	16:13	17:14

TABLE XIIIIB

TRAVEL SPEEDS FOR CALCULATION OF
SPECIAL FACILITY AND SCHOOL EVACUATION TIME ESTIMATES

Eastbound Travel - West of Brentwood, (Route 111)

Routes	Normal Weather	Inclement Weather
I-495	40 mph	32 mph
RT-27	30 mph	24 mph
Other Roads	20 mph	16 mph

Eastbound (Inbound) Travel - East of Brentwood, (Route 111)

Routes	Normal Weather			Inclement Weather		
	Speeds	Prior to	Speed Afterward	Speeds	Prior to	Speed Afterward
I-495	20 mph	6.0 hrs	40 mph	16 mph	7.75 hrs	32 mph
RT-27	20 mph	6.25 hrs	30 mph	16 mph	8.0 hrs	24 mph
Other Roads	20 mph	6.5 hrs	20 mph	16 mph	8.25 hrs	16 mph

Westbound Travel - West of Brentwood, (Route 111)

Routes	Normal Weather			Inclement Weather		
	Speeds	Prior to	Speed Afterward	Speeds	Prior to	Speed Afterward
I-495	15 mph	6.5 hrs	40 mph	12 mph	8.25 hrs	32 mph
RT-27	12 mph	6.75 hrs	30 mph	10 mph	8.5 hrs	24 mph
Other Roads	10 mph	7.0 hrs	20 mph	8 mph	8.75 hrs	16 mph

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TABLE XIII B

TRAVEL SPEEDS FOR CALCULATION OF
SPECIAL FACILITY AND SCHOOL EVACUATION TIME ESTIMATES

(Continued)

Westbound Travel - From EPZ Boundary to Brentwood, (Route 111)

<u>Normal Weather</u>				<u>Inclement Weather</u>		
<u>Routes</u>	<u>Speeds</u>	<u>Prior to</u>	<u>Speed Afterward</u>	<u>Speeds</u>	<u>Prior to</u>	<u>Speed Afterward</u>
I-495	15 mph	6.0 hrs	40 mph	12 mph	7.75 hrs	32 mph
RT-27	12 mph	6.25 hrs	30 mph	10 mph	8.0 hrs	24 mph
Other Roads	10 mph	6.5 hrs	20 mph	8 mph	8.25 hrs	16 mph

Evacuation Travel Within EPZ

<u>Normal Weather</u>					<u>Inclement Weather</u>		
<u>Vehicle</u>	<u>Routes</u>	<u>Speeds</u>	<u>Prior to</u>	<u>Speed Afterward</u>	<u>Speeds</u>	<u>Prior to</u>	<u>Speed Afterward</u>
Ambulance	All	6 mph	5.0 hrs	35 mph	5 mph	6.0 hrs	30 mph
Ambulette	All	6 mph	5.0 hrs	30 mph	5 mph	6.0 hrs	25 mph
Bus	All	6 mph	5.0 hrs	30 mph	5 mph	6.0 hrs	25 mph

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ATTACHMENT D

RECEPTION HOSPITAL LISTING*

SUFFOLK COUNTY

Hospital Name	Address	Telephone Numbers	Number of Additional Patient Which Can Be Accommodated					Time of Contact
			General Admission	Maternity/Ne-borns	Pediatrics	Med./Surg.	ICU/CCU	
1. Eastern Long Island Hospital	201 Manor Place, Greenport	477-1000						
2. Southampton Hospital	240 Meeting House Lane, Southampton	283-2600						
3. Community Hospital Western Suffolk	Route 111 and Smithtown Bypass, Smithtown	979-9800						
4. St. John's Episcopal Hospital	Route 25A, Smithtown	361-2000						
5. Northport V.A. Hospital	Middleville Road, Northport	261-4400						
6. Huntington Hospital	270 Park Avenue, Huntington	351-2000						
7. Southside Hospital	Montauk Highway, Bay Shore	968-3000						
8. Good Samaritan Hospital	1000 Montauk Highway, West Islip	957-4000 661-3000						
9. Brunswick General Hospital	366 Broadway, Amityville	789-7000						

(to be filled in at time of emergency)

* All hospitals listed are at least 5 miles beyond the edge of the 10 mile EPZ and are capable of treating contaminated individuals. See plan section 3.7-1.

RECEPTION HOSPITAL LISTING
 (continued)

NASSAU COUNTY

Hospital Name	Address	Telephone Numbers	Number of Additional Patient Which Can Be Accommodated			
			General Admission	Maternity/ Newborns	Pediatrics	Med./Surg. ICU/CCU Time of Contact
1. Central General Hospital	888 Old Country Road, Plainview	681-8900				
2. Mid-Island Hospital	4295 Hempstead Turnpike, Bethpage	579-6000				
3. Syosset Community Hospital	221 Jericho Turnpike, Syosset	496-6400				
4. Nassau County Medical Center	2201 Hempstead Turnpike, E. Meadow	542-0123				
5. Hempstead General Hospital	800 Front Street, Hempstead	560-1200				
6. Long Beach Memorial Hospital	455 E. Bay Drive, Long Beach	432-8000				
7. South Nassau Communities Hospital	2445 Oceanside Road, Oceanside	763-2030				
8. Mercy Hospital	1000 North Village Avenue, Rockville Centre	255-0111				
9. Winthrop University Hospital	259 First Street, Mineola	663-0333				
10. Community Hospital Glen Cove	St. Andrews Lane, Glen Cove	676-5000				

(to be filled in at time of emergency)

* All hospitals listed are at least 5 miles beyond the edge of the 10 mile EPZ and are capable of treating contaminated individuals. See plan section 3.7-1.

[illegible]

Name: _____

LILCO, April 13, 1988

DOCKETED
USNRC

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CERTIFICATE OF SERVICE

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

In the Matter of
LONG ISLAND LIGHTING COMPANY
(Shoreham Nuclear Power Station, Unit 1)
Docket No. 50-322-OL-3

I hereby certify that copies of TESTIMONY OF DIANE P. DREIKORN AND EDWARD B. LIEBERMAN ON THE REMANDED ISSUE OF THE BASES AND ACCURACY OF LILCO's HOSPITAL EVACUATION TIME ESTIMATES were served this date upon the following by Federal Express as indicated by one asterisk, or by first-class mail, postage prepaid.

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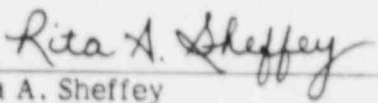
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DATED: April 13, 1988