LILCO, February 10, 1984

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-OL-3
	) (Emergency Planning Proceeding)
(Shoreham Nuclear Power Station, Unit 1)	)

SUPPLEMENTAL TESTIMONY OF MATTHEW C. CORDARO, JOHN A. WEISMANTLE, EDWARD B. LIEBERMAN AND DENNIS S. MILETI ON BEHALF OF LONG ISLAND LIGHTING COMPANY IN RESPONSE TO NEW YORK STATE TESTIMONY ON PHASE II EMERGENCY PLANNING CONTENTION 65

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PURPOSE AND SUMMARY OF TESTIMONY

The purpose of this testimony is to respond to the four concerns raised by staff members of the New York State Department of Transportation about the evacuation time estimates presented in Appendix A to the LILCO Transition Plan. Specifically, this testimony addresses the State's concerns about the capacity values used in developing the evacuation time estimates, the need to calibrate the DYNEV model using Suffolk County-specific data or data from actual evacuations, the likelihood of aggressive behavior during an evacuation, and the effect of roadway construction on evacuation time estimates. It demonstrates that roadway capacities used in developing the evacuation time estimates presented in Appendix A were designed to provide as accurate an estimate as possible, and are consistent with the latest techniques for calculating roadway capacities. Second, the testimony demonstrates

that calibration of the DYNEV model using Suffolk County or prior evacuation traffic data would do little or nothing to improve the reliability and validity of the evacuation time estimates presented in Appendix A. Third, it shows that observations of aggressive behavior at Lake Placid during the 1980 Winter Olympics are simply irrelevant for predicting behavior during a radiological emergency. Finally, the testimony establishes that the proper time for analyzing the effects of roadway construction on evacuation time estimates is at the time that construction is undertaken; no profitable information can be gained from hypothesizing roadway construction.

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TESTIMONY

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

A. [Cordaro] My name is Matthew C. Cordaro. My business address is Long Island Lighting Company, 175 Old Country Road, Hicksville, New York, 11801.

[Weismantle] My name is John A. Weismantle. My business address is Long Island Lighting Company, 100 Old Country Road, Hicksville, New York, 11801.

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

[Mileti] My name is Dennis S. Mileti. My business address is Department of Sociology, Colorado State University, Fort Collins, Colorado, 80523.

2. Q. Please summarize your professional qualifications and your role in emergency planning for the Shoreham Nuclear Power Station.

   A. [Cordaro, Weismantle, Lieberman] Our professional qualifications and our roles in emergency planning for the Shoreham Nuclear Power Station are detailed on pages 2 and 3 of our earlier testimony on Contention 65. Those qualifications and roles have not changed since the preparation of that testimony.

   [Mileti] My professional qualifications have been included in my testimony on Contentions 23, 65.C.2 and 65.F. Those qualifications have not changed since the preparation of that testimony.

3. Q. Could you briefly summarize the purpose of this supplemental testimony?

   A. [Cordaro, Weismantle, Lieberman, Mileti] This supplemental testimony is designed to respond to the four concerns raised by staff members of the New York State Department of Transportation (hereinafter "State witnesses") about the evacuation time estimates presented in Appendix A to the LILCO Transition Plan. Specifically, this testimony will address concerns about the basis for the roadway capacity values used in developing the evacuation time estimates, the need to calibrate the DYNEV model using Suffolk County specific data or data from actual

evacuations, the likelihood of aggressive behavior during an evacuation, and the effect of roadway construction on evacuation time estimates. The bases for this testimony include earlier testimony on Contention 65, the deposition of the State witnesses taken on February 1, 1984, and the general literature on traffic engineering.

4. Q. What conclusions have you reached regarding those aspects of New York State's testimony reviewed by you?

A. [Cordaro, Weismantle, Lieberman, Mileti] In general, the State's testimony expresses only general, unquantified concerns about the evacuation time estimates. In many cases, the State witnesses' concerns are presented in broad concepts of transportation planning and traffic engineering, including such concepts as "capacities or levels of service," "side friction" and "calibration/validation." They have further clouded the issues in this proceeding by applying these concepts to the broad field of transportation planning rather than the specific situation in question -- an evacuation of the Shoreham EPZ. Had the State witnesses focused on the issues raised by evacuation planning for the Shoreham EPZ, most if not all of their concerns would have disappeared.

With respect to the specific State concerns, we have concluded generally as follows: first, the detailed survey of the roadway network and the measurement of queue discharge headways at a number of locations throughout the EPZ conducted as part of KLD's modeling effort provide the verification of the capacity-affecting factors suggested by the State witnesses. Further, while the approach used by KLD is entirely consistent with the 1965 Highway Capacity Manual, as the State witnesses concurred, that manual is not, itself, dispositive. It was designed to serve as a guide for estimating roadway capacities and was never intended to supplant actual observation as a means of determining capacity, and is in the process of being substantially updated.

The State witnesses' concern about a possible surge of evacuation traffic during the first hour of an evacuation assumes that resulting "side friction" will reduce capacity. There is no evidence to support this assumption since traffic flow will be congested due to an excess of demand relative to capacity. In congested conditions, evacuation travel times are governed by the supply and demand relationship. In that setting, a surge of traffic should have little or no effect on evacuation times. In fact, a shortening of the trip generation period could

have the effect of reducing evacuation times since the available capacity of the roadway system would be more fully exploited at an earlier time in the evacuation process.

Second, with regard to calibration/validation, the State witnesses' testimony accurately portrays the application of those modeling techniques to transportation planning models, not evacuation planning models. Had that discussion focused on evacuation planning models, the value of calibrating the DYNEV traffic assignment model using normal Suffolk County traffic information or data from earlier evacuations would have been greatly diminished or found to be nonexistent.

Third, the State witnesses' discussion of aggressive behavior is simply not probative of the situation that will exist during an evacuation. The State witnesses' experience at Lake Placid was centered not on the control of automobile traffic, but rather the attitudes of paying customers to world-class sporting events forced to wait hours in the cold for buses that may never have arrived, with the knowledge that the tickets they had purchased for Olympic events may go unused. This experience is not analogous factually or behaviorally to the circumstances of an evacuation resulting from an emergency at a nuclear power plant.

Fourth, the State witnesses' testimony on the effect of roadway construction projects on evacuation time estimates is generally consistent with earlier testimony of this panel and Dr. Thomas Urbanik for the NRC Staff. All agree that the effects of construction projects are definitionally time and location dependent, having a variety of effects given the location and scope of the project. Given their time-dependent nature, it would appear most prudent to consider any specific effects of these projects on evacuation time estimates and on routing assignments shortly before the actual commencement of construction. Generalized, sensitivity tests based on historical projects will yield no useful information for a decisionmaker faced with making a specific protective action recommendation based on specific highway circumstances at some future date.

5. Q. With regard to roadway capacities, could you briefly describe how capacities were determined in the DYNEV model runs?

A. [Lieberman] Yes. A detailed discussion of the methodologies used to compute capacities is contained on pages III-10 to III-33a of Appendix A to the LILCO Transition Plan and on pages 21-22 of this panel's November 18, 1983 testimony on Contention 65. Briefly, capacities were calculated by the DYNEV system using measured values of queue

discharge headways. These values were obtained from surveys of major intersections in the Shoreham EPZ. These surveys were designed to measure the average headway of vehicles discharging into an intersection during "loaded cycles" -- for the purposes of these surveys, queue lengths of at least five cars were required with no downstream influence. The results showed headways ranging from 2.1 to 2.4 seconds per vehicle, depending on location. For modeling purposes, a value of 2.4 seconds per vehicle was uniformly applied, in part, to account for any trucks or buses that may be in the EPZ at the time of an evacuation. This value is consistent with the recommended default value for capacities at at-grade intersections (1500 vehicles per hour of green per lane) contained in the 1965 Highway Capacity Manual (see 1965 Highway Capacity Manual, p. 126).

In addition to the measurement of queue discharge headways at intersections, all roads in the evacuation network were surveyed to determine whether the roadway section between intersections was the limiting factor for capacity. This survey resulted in lower values in mean headways to reflect lower capacities associated with narrow lanes and adverse geometrics. Many links in the evacuation network were assigned longer headways (i.e., lower

capacities) than the 2.4 seconds per vehicle previously discussed.

The 1965 Highway Capacity Manual was used as a reference in establishing capacities for controlled access freeways, like the Long Island Expressway.

6. Q. Why was this method of calculating capacities chosen, rather than computing capacities using only the Highway Capacity Manual as is suggested by the State witnesses on pages 7-9 of their testimony?

A. [Lieberman] To answer this question fully, it is first necessary to clarify the definition of three terms that are used with varying degress of interchangeability in the State's testimony. Those terms are: "capacity," "service volume," and "Level of Service." Each is a term of art that is specifically defined in the 1965 Highway Capacity Manual.

As defined in the Highway Capacity Manual, the term "Level of Service":

> [D]enotes any one of an infinite number of differing combinations of operating conditions that may occur on a given lane or roadway when it is accommodating various traffic volumes. Level of service is a qualitative measure of the effect of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs.

1965 Highway Capacity Manual at 7. There are a total of six levels of service which are indicated by the letters A through F.

"Service volume" is defined in the 1965 Highway Capacity Manual as:

> [T]he maximum number of vehicles that can pass over a given section of a lane or roadway . . . during a specified time period while operating conditions are maintained corresponding to the selected or specified level of service.

1965 Highway Capacity Manual at 8.

Finally, the 1965 Highway Capacity Manual uses the term "capacity" synonymously with the service volume associated with Level of Service E; this understanding of the term was confirmed by Dr. Hartgen during his deposition (see State Witnesses Dep. Tr. at 42).

The level of service concept is commonly used by planners to determine the dimensions and form of a roadway or roadway system that is being designed to accommodate projected demand. Generally, a roadway is designed to satisfy a specified level of service for the design hour conditions. By contrast, under evacuation conditions we are confronted with a situation that occurs on existing streets. Thus, the goal of the evacuation planner is to reasonably estimate the ability of an existing roadway system to accommodate the expected demand. The 1965 Highway Capacity Manual cannot be relied on for this purpose.

There are several reasons for this. First, as stated on page 3 of the Manual, the information provided in the Manual was "selected to represent typical or average conditions reported throughout the United States at the time of its preparation." The user of the Manual is further cautioned:

> The manual does not, therefore, provide rigid standards for capacity measurements, but instead provides a guide in lieu of more detailed information.

Id. In developing the evacuation time estimates presented in Appendix A, a conscious attempt has been made to provide that direct observation.

Second, the Highway Capacity Manual is based on information that was collected largely during the 1950s. The continuing accuracy of this information, particularly with regard to at-grade intersections, has been seriously questioned by a number of authors. See, e.g., Reilly, Dommasch and Jagannath, "Capacity of Signalized Intersections," U.S. Dept. of Transportation (1974); Gedizlioglu and May, "A Comparison of (Eight) Methods for Signalized Intersection Capacity," Institute of Transportation Studies, University of California, Berkeley (1982).

Third, the Highway Capacity Manual is in the process of being revised and updated (see State Witnesses Dep. Tr. at 27-28). Parts of this new manual have been circulated for

review and comment. For example, the Transportation Research Board has widely circulated for comment a document, commonly known as Circular 212. Transportation Research Circular 212 -- Interim Materials on Highway Capacity (1980). Circular 212 addresses the estimation of capacities at intersections (see State Witnesses Dep. Tr. at 28-29). An important part of Circular 212 is the "critical movement analysis." This analysis depends upon the measurement or estimation of vehicle discharge headways for the purpose of estimating capacities. Thus, the technique of calculating capacity using saturation flow measurements has been well established and will be incorporated as part of the procedures for the new Highway Capacity Manual.

Thus, the procedures followed in developing the roadway capacities presented in Appendix A are designed to provide accurate estimates of roadway capacities and are consistent with the latest information on methods of calculating roadway capacities.

7. Q. In their depositions, State witnesses mentioned the concept of "side friction" as a reason for their concern about capacities (State Witnesses Dep. Tr. at 23), surge traffic (id. at 81), and coarseness of the network that was modeled (id. at 110). Could you explain this term and how it was accounted for in the DYNEV model runs?

A. [Lieberman] The term "side friction" is generally used to describe four traffic movement phenomena:

1. The term is most widely used to describe the effect of a parking lane of cars. The activities of cars parking and of parked cars reentering the traffic steam effectively slows moving vehicles and reduces capacity. This condition would not apply during an evacuation since curb parking activities should not be present during an evacuation. Parking is simply not an expected event.

2. The term is also used to describe the induced slowing that occurs if a relatively wide car seeks to travel down a narrow lane on a roadway.

3. Like item 2, "side friction" can also refer to the induced slowing that may result from cars traveling in opposite directions in the median lanes of an undivided highway.

4. Finally, "side friction" or "driveway friction" can refer to cars discharging from cross-streets or driveways into the paths of cars traveling on a collector road. The result is that drivers on the collector road account for their uncertainties about these cars entering from side streets by increasing their headways relative to other vehicles and by decreasing their speeds. Thus, service volumes on the collector road are reduced.

As a practical matter, side friction has the most effect on service volumes at Levels of Service A through D. These levels of service can be generally characterized as "stable" flow that describe traffic moving on uncongested roadways at speeds at or close to those desired. Under congested, "unstable" flow conditions (Levels of Service E and F), frictional effects are dominated by

congestion effects. In other words, because of the low speed at which vehicles are traveling under congested conditions lateral placement concerns, such as those described in items 2 and 3 above, are greatly diminished. With regard to the merging of traffic from side streets (Item 4), traffic no longer merges from side streets into available gaps in the main traffic stream in moving merges. Instead, the merging of vehicles from the side street is "forced" by insertions into the queue of slow moving vehicles on the collector road. The net effect is not a reduction in service volume on the collector road at the intersection, but rather a sharing of available roadway space between entering cross-street traffic and traffic already on the collector road. This forced merging generally results in a reduction in the rate at which traffic from the upstream leg can enter the intersection, but not a reduction in the capacity of the roadway downstream. Finally, item 1 is not a concern in evacuation traffic modeling because parking activities are not a commonly expected event.

In the DYNEV model, side friction is represented by allowing traffic to enter at cross-streets, thus impeding the progress of vehicles traveling on the collector road. Of course, when the inventory of vehicles on the

cross-street is depleted, the effect of side friction vanishes.

8. Q. Would a surge of traffic at the outset of an evacuation cause congestion and lengthen evacuation times as the State witnesses suggest?

A. [Lieberman] No. As earlier testimony has pointed out, an evacuation of the Shoreham EPZ is best characterized as a network operating under saturated conditions (see Testimony of Cordaro, et al. on Contention 65, pp. 54-57). In that testimony, we considered an extension of the base-case trip generation period from two hours to three hours and the resultant effect on total evacuation times. Based on a comparison of Cases 12 and 21, we concluded that a lengthening of loading times had no effect on evacuation times, because the saturated condition of the roadways, and not the loading times, effectively dictated evacuation times.

The State witnesses on page 9 of their testimony now seek to hypothesize the opposite of a lengthening of trip generation periods. The State witnesses question the effect on evacuation times of an evacuation during early morning hours when most EPZ residents will be at home (see State Witnesses Dep. Tr. at 84). The State witnesses argue that a shorter trip generation period would increase side friction (id. at 81) since people would seek to push

their way onto the major evacuation routes (id. at 82). Thus, they argue service volumes would be reduced and evacuation times increased.

The State witnesses' testimony is mere unsupported speculation. If a shorter trip generation period is assumed, saturated conditions will still occur, though perhaps somewhat earlier. The most likely direction of effect of this earlier onset of congestion would be to reduce evacuation times, since the available capacity of the roadway system would be fully exploited at an earlier time in the evacuation process. In any case, as explained in response to the previous question, the basic supply and demand problem would not change. The major effect of a surge would be to alter the order in which vehicles leave the EPZ but not the time the last car leaves the EPZ.

9. Q. Do the State witnesses use the terms "calibration" and "validation" in the same manner they were used in this panel's earlier testimony on Contention 65?

A. [Lieberman] No. In this panel's earlier testimony on Contention 65, the term "validation" was used to describe the process by which the accuracy of a model's results is assessed. The process generally involves taking extensive data and then comparing those actual data against predicted results. The term "calibration" has been used to describe the process of accumulating all of the inputs

needed to run the DYNEV system, including such inputs as specific roadway characteristics, origin/destination pairs and other input parameters. See Hearing Tr. 2507.

The State witnesses generally use the terms synonymously (see State Witnesses Dep. Tr. at 100). The definition for these terms used by the State witnesses is similar to the definition of validation used in this panel's earlier testimony (see Direct Testimony of Hartgen, et al. at 11-12), and thus does not address the concept of calibration as used in our original testimony.

It is also worth noting that the discussion of "calibration/validation" on pages 11 to 14 of New York State's testimony is premised on a different set of models than those discussed in this panel's earlier testimony on Contention 65. The State's testimony focuses on the calibration of transportation planning models (see Testimony of Hartgen, et al. at 13 [reference to "specific base-year adjustment"] and Attachment C [a graph from a publication dealing with "Urbanized Area Project Planning and Design"]). The general purpose of a transportation planning model is to predict future transportation patterns. As such, the calibration activities for these models rely on historical and current data to identify independent variables that will affect those transportation

patterns and to define and quantify the parametric relationships among those variables. These baseline data are then revised as time passes and future events become historical ones. The result of these revisions can take the form of a redefinition of independent variables and/or of the parametric relationships among them.

By constrast, the intrinsic relationships contained in the three modules of the DYNEV system -- the traffic assignment model, the capacity model and the traffic simulation model -- are unlikely to vary with time. The traffic assignment model, as applied to an evacuation situation, makes the fundamental assumption that evacuees have knowledge of the most rapid means of evacuating the EPZ, resulting from the public information program. Thus, the traffic assignment model is keyed to human behavior and not to area-dependent factors that may vary from one location to another and require adjustment with time. The traffic capacity model and the traffic simulation model both focus on driver behavior at a microscopic level. The former depends primarily on motorist responses to the presence of conflicting traffic, to restraints asserted by control devices, to lane channelization and to roadway geometrics; the latter depends on driver behavior while moving in a traffic stream and executing movements at

intersections. In both cases, driver behavior is the key variable. These key behavioral parameters have been observed, measured and specified as empirical information in the model inputs. These types of behavioral responses are generally consistent both geographically and with time. Thus frequent validation of the models is not required and, in fact, is not undertaken in normal practice.

10. Q. Would the calibration or validation of the DYNEV system using Suffolk County highway statistics for a normal day or data from an earlier evacuation improve the reliability and validity of evacuation time estimates presented in Appendix A?

A. [Lieberman] No. As just discussed, the calibration of the DYNEV system consists of the quantification of the behavioral responses of drivers and of the geometric descriptors of the evacuation network that influence the movement of traffic over the network. Within the context of evacuation planning, the calibration parameters of primary importance are those which contribute to the estimation of roadway capacity. Those parameters are applicable to all models of the DYNEV system -- trip assignment, approach capacity, and traffic simulation. As detailed earlier, all such parameters have been quantified by direct field observation using applicable capacity manual procedures. In our view, the DYNEV system has been properly calibrated.

As discussed on pages 31-33 of this panel's November 18 testimony on Contention 65, all models of the DYNEV system have been validated. Based on our review of the emergency planning literature, no other computer package used for estimating evacuation travel times for radiological emergencies can point to a history of more rigorous validation activity than the DYNEV system.

Thus, the additional field work suggested by the State is unnecessary and represents a departure from current practice. To the best of my knowledge, no such large-scale activity was undertaken for any other computing tool used to estimate evacuation travel times for operating nuclear plants in New York State, yet all such estimates have been approved by the State reviewers.

To perform the validation of the traffic assignment model suggested by the State witnesses, a large detailed data base would need to be acquired through extensive field surveys. An accurate trip table of "normal" traffic flow would need to be produced and then field observations of traffic volume on each and every network link would have to be made. Since the travel patterns during "normal" traffic conditions will bear no resemblance to those anticipated for a general evacuation the Shoreham EPZ, the utility of such a heroic and unprecedented activity would undoubtedly be subject to further question.

The State witnesses' alternative suggestion that data from actual evacuations be used to validate the DYNEV system (see Testimony of Hartgen, et al. at 5; State Witnesses Dep. Tr. at 98-99) is similarly unpromising. The type of detailed information needed to statistically validate the DYNEV system is not available, to our knowledge, from any previous evacuation. To acquire such a data set, one would have to have planned the data collection program prior to the emergency; and then, at the onset of the emergency, have deployed a large number of data gatherers. These are hardly realistic expectations for the purpose of calibrating a model.

In summary, the validated DYNEV system has already been calibrated in detail for the Shoreham EPZ. In these respects, DYNEV generally exceeds the credentials of other tools used for evacuation purposes nationwide. The State witnesses' suggestion does little more than advocate the replication of a process which has already been completed.

11. Q. On page 14 of the State's testimony, there is a suggestion that the evacuation network modeled by KLD is not sufficiently detailed to produce valid and reliable results. How was this network chosen?

A. [Lieberman] The configuration of the evacuation network for the Shoreham EPZ has been defined with great care. Approximately 280 links have been modeled -- a level of

detail that is about twice that suggested by Parsons, Brinckerhoff, Quade & Douglas and used by KLD for the Indian Point EPZ. These 280 links include all expressways, primary, and secondary roads as well as many tertiary roads that were considered to be of sufficient importance to be included. See Hearing Tr. 2433-35.

The delineation of the evacuation network was undertaken as the result of many field surveys, a detailed study of large scale maps and a careful review of the early Suffolk County plan. This early plan was reviewed by New York State personnel; that review produced no comments, to the best of our knowledge, about the inadequacy of the detail of the network.

12. Q. Would the modeling of additional roadways in the EPZ have affected the evacuation time estimates produced?

A. [Lieberman] No. No planning effort attempts to model all local streets and local collector roads. Specifically, one need model only those tertiary roads whose capacities may impede the movement of traffic. It is unnecessary to model explicitly roadways which may become congested as a result of capacity limitations on other roadways in the evacuation network. For example, local cross streets that become congested as a result of a slow rate of forced merges into congested collector roads, and not by a

shortfall of cross-street capacity, need not be explicitly modeled. The DYNEV system explicitly considers this inventory of cars on cross streets awaiting entry to collector roads and does so without the need to include such cross streets as part of the evacuation network. Thus, the consequence of such congestion on the local streets is included in the process of calculating the movement of all vehicles and in estimating the delay they may experience.

13. Q. On pages 15 and 16 of the State's testimony, there is a discussion of "aggressive behavior" that occurred at Lake Placid during the 1980 Winter Olympics. Does that experience provide insight into behavioral reactions likely to occur during an evacuation of the Shoreham EPZ?

A. [Mileti] Not at all. What took place at Lake Placid, so far as can be judged from contemporary press reports and the depositions of New York State Witnesses, was the result of ineffective transportation planning for crowds of paying customers varying between 25,000 and 50,000 per day, who were interested in traveling to, seeing and returning on schedule from athletic events bearing prices up to $50 or $60 per ticket. The Lake Placid traffic control scheme was premised on restricting vehicle access to the small town. Three large principal satellite parking areas, varying in distance from about 1 to 8 miles away, were provided for spectators arriving by car. These spectators were required to park their cars in these satellite

lots, and shuttle buses were planned to ferry them between those areas and the athletic events. Charter buses for spectators and a limited number of "official" cars were also to be permitted access to the competition area.

Approximately 300 buses were initially contracted for. Of these, only 80 or so were present during the first day's events. In addition, it became apparent that numerous ticket package deals, originally contemplated to include charter-bus transportation, had in fact been sold without it. Thus, a larger proportion of spectators arrived by automobile than had been contemplated, with only a fraction of the originally contemplated buses to shuttle them from satellite parking lots to athletic events and back. Scheduling problems for those buses that were available, resulting in under-utilization of those buses, were also reported. The result was hours-long waits in snowy satellite parking lots by spectators trying to board buses to travel on time for the start of events for which they had purchased tickets bearing face prices of up to $50 and $60. Some spectators waited in queues; other hitchhiked; other walked through the snow; others tried to drive their cars, without authorization, into town.

On the fifth day of the Olympics, with the situation still basically unimproved, Governor Carey declared a limited state of emergency, permitting the infusion of State resources, the supply of additional buses, and the removal of restrictions on bus drivers' daily working hours, and other measures. At the time Governor Carey made his declaration, Howard Clark, a spokesman for the New York State Olympic Task Force, was quoted as stating, "The state of emergency does not mean there is danger to life and limb." (Washington Post, February 17, 1980).

In short, the "aggressive behavior" reported by the State's witnesses at the Lake Placid Olympics was associated with the frustration of large crowds who had paid significant sums of money in the expectation of seeing world-class sports entertainment, and who often ended up stranded for hours in lines waiting vainly for transportation to take them to see the very events for which they had paid. The situation was aggravated, though not seriously from a health standpoint, by the cold winter weather and snow. This situation is, behaviorally, signficantly different from a true community-wide emergency, such as the occurrence of a major flood, or hurricane, or nuclear power plant accident.

Community-wide emergencies, such as an evacuation following a nuclear accident, are different from most other settings from a human behavior viewpoint. Descriptive accounts of human behavior associated with other events, like sporting events, cannot be used to model or predict human behavior during community-wide emergencies and vice versa. This is the case despite the fact that categories of behavior, for example, line-standing, driving, etc., could be common to both settings. This is still the case even if "stress" and/or "anxiety" are common to both settings.

Emergencies in which a community is threatened (life, health, safety, and so on) are, behaviorally, in a class by themselves. Aberrant and anti-social acts that sometimes occur in other settings dramatically fall off during community-wide emergencies. Fights, arguments, and other manifestations of "putting-oneself-first" that can and do occur in the course of everyday social life all but disappear. The mechanism that fosters the decline of aggressive, aberrant and anti-social acts in community-wide emergencies does not prevail in most other social settings, for example, during sporting events when people are in crowds.

Communities in emergencies are transformed behaviorally at both the group and individual levels. Priorities shift, goals and objectives are transformed, and identifications change. The first priority becomes the collective safety of people and the community. The prime goal and objective becomes serving the first priority. People shed personal, racial, ethnic, and other forms of personal identification and identify with the entire human collective or community that is at risk. This social psychological "shift" that characterizes emergencies results in the "falling-off" of acts and behavior that run counter to the good of the collective, which serve or stem from interests that are individual or personal. This "shift" would undoubtedly occur in an emergency at Shoreham. It does not operate at sporting events. This phenomenon has been documented in every emergency studied by social scientists where it has been a topic of investigation; evidence of it can also be found in emergencies where it was not formally a topic of investigation. Perhaps because the popular image of human behavior in such emergencies is so much the opposite of fact, most communities that experience an emergency come to boast of how "unique" are their local citizens who came together "when the chips were down."

Were an emergency ever to occur at Shoreham, it is inconceivable that traffic guides would be harassed, verbally abused, physically assaulted or encounter other acts that would typify the behavior of people not affected by the "collective identification" which would occur among those experiencing the emergency. Traffic guides would not, therefore, be seen as targets for aggression or people "in the way." Rather, they would most likely be perceived as persons who are offering help and assistance useful to all those at risk.

14. Q. On pages 18 and 19 of their testimony, the State witnesses suggest that it would be prudent to conduct sensitivity studies of the effects of historical construction projects on evacuation time estimates. Do you believe these sensitivity studies would be valuable?

A. [Cordaro, Weismantle, Lieberman] No. As has been previously noted by us in these proceedings (Testimony of Cordaro, et al. on Contention 65 at 87; see also Testimony of Dr. Thomas Urbanik II at 14) and by the State's testimony (see Testimony of Hartgen, et al. at 18 and Attachment D), construction projects are definitionally time and location dependent. Construction schedules can advance or slip depending on a variety of factors including weather, funding availability, and changes in priorities, based on changes in roadway conditions following the initial funding approval. Construction projects also vary in their

potential effect on a planned evacuation; some projects will permit roadway restoration in a matter of hours, others may remove a lane from service for an extended period of time (see Testimony of Hartgen, et al., Attachment D).

Given their time-dependent nature, it would appear most prudent to consider the specific effects of construction projects on evacuation time estimates and on routing assignments, specifically after the work statements are finalized, the contract provisions for maintaining traffic flow known, and the schedules for work defined. This information is only available shortly before the commencement of construction. LERO intends to review ongoing construction projects on a periodic basis, and to make revisions in evacuation time estimates and routing assignments as necessary.

However, generalized sensitivity studies based on historical studies will yield no useful information for a decisionmaker faced with making a protective action recommendation at some future date.

LILCO, February 10, 1984

CERTIFICATE OF SERVICE

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

I hereby certify that copies of SUPPLEMENTAL TESTIMONY OF MATTHEW C. CORDARO, JOHN A. WEISMANTLE, EDWARD B. LIEBERMAN AND DENNIS S. MILETI ON BEHALF OF LONG ISLAND LIGHTING COMPANY IN RESPONSE TO NEW YORK STATE TESTIMONY ON PHASE II EMERGENCY PLANNING CONTENTION 65 were served this date upon the following by first-class mail, postage prepaid, or by hand (as indicated by one asterisk), or by Federal Express (as indicated by two asterisks).

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DATED: February 10, 1984