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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

OFFICE OF SECRETARY
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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)
) (School Bus Driver Issue)
) (Hospital ETes)

LILCO'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS
OF LAW IN THE FORM OF A PARTIAL INITIAL DECISION
ON THE REMAND ISSUES OF SCHOOL BUS DRIVER ROLE
CONFLICT AND HOSPITAL EVACUATION TIME ESTIMATES (ETes)

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

June 22, 1988

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I. Introduction

This is a Partial Initial Decision on offsite emergency planning issues pertaining to the application of the Long Island Lighting Company (LILCO) for an operating license at Unit 1 of the Shoreham Nuclear Power Station (Shoreham). The decision addresses the adequacy of the number and availability of school bus drivers for the evacuation of school children and the adequacy of the evacuation time estimates (ETEs) for three hospitals in the event of a radiological emergency at Shoreham. The number and availability of school bus drivers and the hospital ETES are evaluated for compliance with NRC regulatory standards on emergency planning codified in 10 CFR § 50.47, Appendix E, and the criteria of NUREG-0654, FEMA-REP-1, Rev. 1. Also, the dictates of the Appeal Board in Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), ALAB-832, 23 NRC 135 (1986), and the Commission in Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), CLI-87-12, 26 NRC 383, 395-99 (1987), are required to be considered. Proposed findings of fact and conclusions of law were submitted by LILCO, New York State, Suffolk County, and the Town of Southampton

(Intervenors) and the Nuclear Regulatory Staff (Staff). All of the proposed findings of fact and conclusions of law have been considered. Any such finding or conclusion not incorporated directly or inferentially in this Partial Initial Decision is rejected as unsupported in fact or law or unnecessary to the rendering of this decision.

II. Role Conflict of School Bus Drivers

A. History of the Issue

1. Phase I

"Role conflict" of emergency workers has been under consideration by this Board off and on for about six years. Role conflict as a postulated problem in a radiological emergency was first raised as part of Suffolk County's Contention EP 5 in the "Phase I" (onsite) portion of this proceeding. See Appendix B to September 7, 1982 Supplemental Prehearing Conference Order (Phase I -- Emergency Planning), slip op. at 5-6 (Oct. 4, 1982), listing the "admitted phase one contentions."

In Contention EP 5 Suffolk County contended that LILCO had failed to provide reasonable assurance that "onsite assistance from offsite agencies would be forthcoming." In addition, the contention alleged that LILCO had not demonstrated adequately that it would be able to augment its onsite emergency response staff in a timely manner. The first reason alleged for these shortcomings was in EP 5.A:

A. It does not appear that LILCO has addressed or analyzed the possibility that offsite personnel and/or onsite augmenting personnel expected to report to the Shoreham site for emergency duty, would fail to report (or report in a timely manner) because of conflicting family (or other) duties that would arise in the event of a radiological emergency.

Id. slip op. at 6.

Suffolk County filed written testimony on this contention. Direct Testimony of Dr. Kai T. Erikson and Dr. Stephen Cole on Behalf of Suffolk County Regarding

Contention EP 5A [Role Conflict] (Oct. 12, 1982). That written testimony addressed LILCO personnel who might be offsite at the time of an accident but who might be expected to report to the Shoreham site, as well as non-LILCO personnel such as "volunteer fire departments." Id. at 4. The Suffolk County Phase I testimony also explicitly addressed school bus drivers:

Suffolk County recently undertook a survey of volunteer firemen and school bus drivers, both groups of which could be necessary to perform important emergency services during a radiological emergency. School bus drivers, for instance, could be expected to drive school children or persons without transportation away from a potential area of danger. Likewise, volunteer firemen are likely to be assigned evacuation, ambulance, rescue or fire fighting duties.

Id. at 7-8. As attachments to that testimony, the County witnesses included the September 1982 survey of volunteer firemen and the September 1982 survey of school bus drivers.

LILCO also presented "Phase I" written testimony on role conflict. Testimony of Matthew C. Cordaro, Russell R. Dynes, Dennis S. Milet, and James Rivello on Behalf of the Long Island Lighting Company on Phase I Emergency Planning Contention 5(A) -- Role Conflict (Oct. 12, 1982). Among other things, LILCO's witness Russell Dynes, head of the Disaster Research Center, reported that in over 6000 interviews by the DRC, he had been unable to determine an example of non-reporting, or of leaving one's emergency responsibility. Id. at 8.

None of this Phase I testimony was heard because of the Board's dismissal of the Phase I contentions. The explicit inclusion of role conflict of school bus drivers in Suffolk County's Phase I testimony brings the issue within the scope of the Board's dismissal of the Phase I contentions, a decision that was affirmed by the Appeal Board. Long Island Lighting Co. (Shoreham Nuclear Power Station), LBP-82-115, 16 NRC 1923, 1936 (1982), aff'd in principal part, ALAB-788, 20 NRC 1102, 1176-79 (1984). This would

be an independent reason for denying a hearing on this issue. Nevertheless, as directed by the Appeal Board, the Board has reached the merits, as discussed below.

2. 1983-84 Hearings

In "Phase II" of this proceeding, Suffolk County again raised the issue of role conflict of emergency workers. This time the issue was raised in Contention EP 25. Contention 25 alleged that "a substantial number of emergency workers relied upon under the LILCO Plan will resolve such conflicts by attending to their other obligations prior to, or in lieu of performing the emergency functions assigned to them by LILCO." 21 NRC at 981.^{1/}

Contention 25 in its various subparts covered the following emergency personnel and auxiliaries: all LILCO personnel assigned to perform emergency response functions (25.A); Brookhaven National Lab personnel (25.B); school bus drivers (25.C); teachers, other school employees, and crossing guards (25.D); ambulance drivers and people providing "medical and paramedical support services in the buses, ambulances, railroad cars and airplanes to be used in evacuating special facilities and handicapped persons" and Long Island Railroad personnel, private airplane crews, and employees of a lumber company (25.E); and relocation centers staff including the American Red Cross, the Salvation Army, and groups such as "churches, industries, and select volunteers" (25.F). 21 NRC at 981-83.

As to all of these groups of people who were still included in the plan at the time of the hearing, the Board decided in LILCO's favor in its Partial Initial Decision, Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-85-12, 21 NRC 644,

^{1/} Contention EP 11 on "conflict of interest" also addressed role conflict, this time the alleged conflict between the role of LILCO employee and the role of emergency manager. See PID, 21 NRC at 964.

671-79 (1985) (hereinafter cited as "PID"). School bus drivers were included in this finding. PID, 21 NRC at 675-76, 859.

3. Appeal Board Review

The Intervenors, now including New York State, sought review of the Board's Partial Initial Decision. In ALAB-832, the Appeal Board affirmed the Board with respect to role conflict of all these groups, including school teachers, except school bus drivers. It remanded the issue of role conflict of school bus drivers. ALAB-832, 23 NRC 135, 149-54 (1986). In particular, the Appeal Board concluded that the Board had erred in excluding testimony relating to the September 1982 survey of volunteer firemen. The Appeal Board said that, in its view, "the results of a survey as to the potential for role conflict among firemen, if they had been part of the emergency response, would provide insight into the likely course of conduct of school bus drivers." *Id.* at 153 (footnote omitted). The Appeal Board distinguished LERO personnel on the ground that they had undergone considerable training with regard to their required duties and responsibilities. *Id.* at 153 n.64. It distinguished teachers and health care personnel on the grounds that they "essentially continued to perform their regular duties during a Shoreham emergency." *Id.* at 153 n.65.

In concluding that the Licensing Board should consider the September 1982 fireman poll, the Appeal Board relied on its earlier opinion in the *Zimmer* case. Cincinnati Gas & Electric Co. (William H. Zimmer Nuclear Power Station, Unit No. 1), ALAB-727, 17 NRC 760, 772 (1983). The Appeal Board had found in *Zimmer* that there was evidence in the record that "raises a serious question as to whether bus drivers could be depended upon to carry out their responsibilities in these counties in such an emergency." ALAB-727, 17 NRC 760, 772 (1983). Apparently this evidence was the testimony of New Richmond Life Squad Assistant Chief Feldkamp.^{2/} *Id.*, citing Feldkamp, ff. Tr.

^{2/} Mr. Feldkamp's *Zimmer* testimony is Attachment 3 to these proposed findings.

5467, at 2-3, and Tr. 5461. Chief Feldkamp had testified that "approximately 95% of the New Richmond life squad personnel and 25% of the fire personnel have indicated that they will not respond to the Zimmer station in the event of a nuclear emergency."^{3/} Cincinnati Gas & Electric Co. (William H. Zimmer Nuclear Power Station, Unit 1), LBP-82-47, 15 NRC 1538, 1597 (1982). Mr. Feldkamp's opinion was apparently based on conversations with his co-workers.^{4/} There is no indication in the Zimmer decisions (either LBP-82-47 or ALAB-727) that there was any testimony about human behavior by experts. Indeed, in Zimmer the role conflict issue "simply was not considered at the hearing stage." ALAB-727, 17 NRC 760, 772 (1983). The Zimmer Licensing Board did find, however, that the historic record showed that role abandonment had not been a problem:

78. While many witnesses expressed doubts about whether volunteers would respond to a Zimmer emergency, some also testified that volunteers have always responded to calls to duty in the past [citations omitted]. This is consistent with the testimony of Applicants, FEMA, Kentucky and Ohio that, as a general proposition, volunteers readily respond during emergencies [citations omitted], as well as the

^{3/} Mr. Feldkamp also believed that the community would overreact and probably panic. Feldkamp, ff. Tr. 5467 in Zimmer record (Doc. No. 50-358), at 4.

^{4/} "During the course of my involvement as both a life squadsman and fireman in association with the members of the life squad and firemen of the Village of New Richmond, approximately 95% of the life squadmen have indicated and [sic] will not respond in a volunteer emergency response role in the event of a Zimmer Station accident. As to firemen, approximately 25% will not respond in an emergency role." Feldkamp, ff. Tr. 5467 (Doc. No. 50-358), at 2-3, Mr. Feldkamp was "talking mostly of lifesquad people." Tr. 5475. Later on he testified "the people that told me that they would not respond are life squad people." Tr. 5491.

The New Richmond life squad had 16 members and the fire department had 30 members. Id. at 1. Four people were a member of both, id. at 1-2, so a total of 42 people were involved, 38 on either the life squad or the fire department and four on both.

Mr. Feldkamp testified that he himself, as long as he was able to monitor himself and the surroundings, would perform the duties as well as he was able to. Tr. 5476. But he said he would first get his family out of town. Tr. 5492.

testimony of some of the volunteers themselves [citation omitted].

Zimmer, LBP-82-47, 15 NRC 1538, 1599 ¶ 78 (1982). The Zimmer remand was never heard because the plant was canceled.

4. Remand

On remand, LILCO moved for summary disposition of the school bus driver role conflict issue. LILCO's Motion for Summary Disposition of Contention 25.C ("Role Conflict" of School Bus Drivers), Oct. 22, 1987. The Board denied the motion for a number of reasons. Memorandum and Order (Ruling on Applicant's Motion of October 22, 1987 for Summary Disposition of Contention 25.C Role Conflict of School Bus Drivers) (Dec. 30, 1987). We held that the Appeal Board expected its remand directive to be weighed in the environment of a litigated proceeding. Id., slip op. at 4.

LILCO then moved for a ruling in limine to define the scope of the remanded issue. The Board granted LILCO's motion.^{5/} Memorandum and Order (Ruling on LILCO Motion In Limine and Motion to Set Schedule) (Feb. 23, 1988). We held that "questions concerning availability of buses, reception centers for school children, and evacuation time estimates are not within scope of remanded bus driver issue." Id., slip op. at 4.^{6/} The basic issue to be explored by the Board is whether, in light of the potential for role conflict, a sufficient number of school bus drivers can be relied upon to perform emergency evacuation duties. Memorandum and Order (Ruling on Applicant's Motion of October 22, 1987 for Summary Disposition of Contention 25.C Role Conflict of School Bus Drivers) at 5 (Dec. 30, 1987); see also Tr. 20,052-56, 20,068 (Judge Gleason).

^{5/} When a licensing board receives a case back on remand it has jurisdiction only over issues remanded to it. Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant, Units 1-4), ALAB-526, 9 NRC 122, 124 (1979); Portland General Electric Co. (Trojan Nuclear Plant), ALAB-534, 9 NRC 287, 289-90 n.6 (1979).

^{6/} Likewise, many other issues about early dismissal, sheltering, and evacuation of school children were litigated earlier and not remanded. See PID, 21 NRC at 855-74.

Six days of hearings were held on this issue. On May 16, 17, 18, and 19 LILCO presented its witnesses Douglas M. Crocker, Robert B. Kelly, Michael K. Lindell, and Dennis S. Mileti. On May 26 Suffolk County presented testimony of several school board officials: Bruce G. Brodsky, Edward J. Doherty, Howard M. Koenig, Nick F. Muto, Robert W. Petrilak, Anthony R. Rossi, J. Thomas Smith, and Richard N. Suprina. On June 2 Suffolk County presented testimony by sociologists Stephen Cole, Ralph H. Turner, and Allen H. Barton. The State of New York, the NRC Staff, and FEMA^{7/} presented no witnesses.^{8/}

By contrast, the original hearings on role conflict of all the groups of people covered by the contention in 1983 and 1984 were held on seven hearing days.^{9/} In 1983 Suffolk County's prefiled written testimony, covering all the groups covered by the contention, consisted of only 101 pages of written testimony (not counting attachments). On remand the County's written testimony covering school bus drivers alone was 140 pages, exclusive of attachments. In short, the Board feels that it has given the remanded issue a thorough airing, even though some of the County's testimony was outside the scope of the remanded issue and therefore was stricken.

^{7/} FEMA's witness Mr. McIntire did attempt to address role conflict of school bus drivers in 1983. He testified that training about radiation plus being equipped with personal dosimetry helped bus drivers in the Indian Point plan mitigate their fears that they would be contaminated. Tr. 2142-43, 2157-58 (McIntire). Extra compensation also helped. Tr. 2143-44 (McIntire). LILCO testified at the time that it would offer basic radiological training to school bus drivers and reimburse them for the time spent in such training. Cordaro et al., ff. Tr. 831, at 35; Tr. 960-61, 1172 (Weismantle).

^{8/} Attachment 1 to these proposed findings is a list of witnesses; Attachment 2 is a list of evidentiary exhibits.

^{9/} Dec. 6-7 (Cordaro et al.), Dec. 8 (Dilworth et al.), Dec. 12 (Erikson and Johnson), Dec. 15-16 (McIntire), 1983, and Jan. 25, 1984 (Petrilak et al.).

B. Background of the Role Conflict Issue

1. Other Cases

"Role conflict" has been litigated and resolved in several other cases. Some of the same witnesses who testified before this Board have testified in those other cases. In each case the licensing boards have concluded that role conflict was not an obstacle to a full-power operating license.

In 1981 role conflict was addressed in the Three Mile Island case. Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1486-89 (1981), aff'd in principal part, CLI-83-22, 18 NRC 299 (1983). On the "larger issue" of role conflict, the TMI board concluded that there was no evidence that contravened the finding that there would be an adequate number of emergency workers. 14 NRC at 1489. The intervenors' "main concern," said the board, appeared to be "that the problem will lie in reliance on parents of small children to work during the evacuation process, in particular those mothers who are school bus drivers." Id.

The TMI board also found as follows:

1815. Based on our detailed review of the evidence before us, we find no reason to believe that the majority of the emergency workers in the area surrounding Three Mile Island will do other than to perform their assigned duties in the event of an emergency, nuclear or otherwise. Therefore, while we understand the concern of the intervenors we reject the contention that there is no assurance that school bus drivers will perform as assigned. In doing so, we recognize that school bus drivers are not necessarily as likely as emergency workers in general to be available during an emergency, in that some or even many school bus drivers are homemakers who may have conflicting family responsibilities. However, given the void in the evidence on this particular point, and the general evidence of availability of emergency workers in other emergencies, in our subjective judgment we do not believe that so many school bus drivers will fail to perform their duties that the evacuation of schools will be disrupted. Given proper procedures in place to provide the buses, we believe it is highly unlikely that back-up drivers, such as school teachers or police personnel, cannot be quickly utilized to make up any deficit of expected school bus drivers. While it may be

arguably prudent to provide now for back-up drivers, it will always be arguably prudent to provide more in planning for an emergency. In this instance, we believe that planning is not required for a specific list of back-up drivers, as there are many sources of such drivers available on short notice, e.g., through the school's own resources (teachers), police personnel, and through the County Transportation Coordinator.

14 NRC at 1629 ¶ 1815.

The TMI board discussed the evidence about school bus drivers in considerable detail. 14 NRC at 1631-41. In particular, the board considered a series of interviews with, among others, school superintendents. Id. at 1632. Apparently these interviews produced statements, like those from Intervenor witnesses in the Shoreham case, that school bus drivers could not be relied on. For example, one school superintendent apparently commented that "[s]ome bus drivers evacuated early during the last crisis." Id. at 1635 n.202. A statement by one bus company representative that 108 of his company's 110 bus drivers had reported for duty during the TMI-2 accident did not find its way into the TMI intervenor's report. Id. at 1634.

The TMI board held that written school plans should be filed promptly. Id. at 1638, 1640. As a condition of restart, the NRC Staff was directed to certify to the Commission when school plans had been completed and reviewed for adequacy. Id. at 1706. Role conflict was not an obstacle to full-power operation.

Role conflict was also litigated in Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-82-70, 16 NRC 756, 767-68 (1982), aff'd, CLI-84-13, 20 NRC 267 (1984). The focus of concern in Diablo Canyon was on "volunteers" or general workers such as gas station attendants and bus drivers. Id. at 768. The board accepted that some general workers might not report for duty. Id. But it also found sufficient "mitigating circumstances":

We are convinced that most responsible workers would resolve their conflicts in a common-sense fashion by seeing to their families' safety and then reporting for duty.

Id. at 768, 805.^{10/} In its specific findings the board found that

Experience from actual emergencies does not indicate that emergency workers fail to perform their duties during an emergency.

Id. at 805 (citing Dr. Kai Erikson and another witness). The board noted that no special emergency training would be given volunteer workers (described as performing noncritical but useful functions). Id. at 805 ¶ 45. And the board found that a scientific sociological survey of emergency workers as advocated by Drs. Erikson and Johnson was not necessary. Id. ¶ 46.

In the Indian Point proceeding, New York State witnesses testified that professional emergency workers do not forsake their duties. Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 959 (1983) (citing Davidoff/Czech),^{11/} reviewed, CLI-85-6, 21 NRC 1043 (1985). The board said that there remained a concern about teachers and bus drivers, but that these conflicts could be readily resolved by proper planning and implementation. 18 NRC at 959. If letters of agreement were obtained for bus drivers, presumably those drivers would not be subject to, or would have resolved, conflicting duties. Id.^{12/}

^{10/} Similarly, making prior arrangements for one's family was referred to by a witness in the Three Mile Island case as "the old common sense scenario." Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1489 (1981).

^{11/} The New York State witnesses also testified in favor of an early dismissal plan. 18 NRC at 983-84, 985.

^{12/} FEMA had found a deficiency in the lack of agreements for Westchester County bus drivers. 18 NRC at 930, 935, 955.

Similarly, a decision by the Director of Nuclear Reactor Regulation in the Fermi case noted that in the past volunteers have performed well both in drills and in real, nonradiological emergencies. The Detroit Edison Co. (Enrico Fermi Atomic Power Plant, Unit 2), DD-84-11, 19 NRC 1108, 1116-18 (1984) (it is the experience of FEMA and the NRC in evaluating well over 100 full-scale emergency preparedness exercises at nuclear power plants across the country that volunteer emergency workers willingly participate in and respond to simulated radiological emergencies, as they do to actual emergencies involving toxic and hazardous materials, id. at 1116). The Director found reasonable assurance that Fermi 2 would meet applicable regulatory requirements and guidance, id. at 1126-27.^{13/}

More recently, role conflict of both school teachers and bus drivers was litigated in the Limerick case. Philadelphia Electric Co. (Limerick Generating Station, Units 1 & 2), LBP-85-14, 21 NRC 1219, 1292-95, 1320, 1326, remanded, ALAB-836, 23 NRC 479 (1986). With respect to bus drivers the board found:

342. The evidence in the record of this proceeding supports the historic record that drivers will perform assigned functions. FEMA witnesses testified that the history of response to emergencies shows a willingness by individuals to perform their duties and that individuals who have a clear understanding of their roles in an emergency plan do not abandon these roles in time of emergency. A comprehensive training program for bus drivers is needed to provide a clear understanding of what is required. FEMA was unable to make

^{13/} The Director of the NRC's Office of Inspection and Enforcement declined to institute § 2.202 proceedings to revoke the license at the Davis-Besse plant despite a bus driver union's nonbinding resolution not to participate in planning for evacuation. Toledo Edison Co. (Davis-Besse Nuclear Power Station, Unit 1), DD-86-17, 24 NRC 753 (1986).

Cf. Virginia Electric and Power Co. (North Anna Nuclear Power Station, Units 1 and 2), LBP-77-68, 6 NRC 1127, 1158 (1977), affirmed, ALAB-491, 8 NRC 245 (1978) (finding that the emergency plan could contain little more than it did to assure that utility employees would remain at their jobs or to assure the response of offsite emergency organizations).

any determinations as to the adequacy of the ongoing bus driver training because it was not familiar with the specifics of such training. Asher and Kinard (Admitted Contentions), ff. Tr. 20,150, at 26-27. The lesson plans that have been reviewed by FEMA are, however, for the most part, comprehensive in nature. Kinard, Tr. 20,208. As of December 3, 1984, in Montgomery County, thirty-nine bus drivers had received training. Bigelow, Tr. 14,140. In Chester County, as of January 23, 1985, forty-three bus drivers have been trained. Campbell, Tr. 19,890. Verbal and written notice by the Montgomery County Office Of Emergency Preparedness has been made to all bus providers; however, at the time of the hearing no bus provider in Montgomery County had taken advantage of bus driver training offered by Energy Consultants. Bigelow, Tr. 14,140-41, 14,188-90. Training will continue to be offered. Bigelow, Tr. 14,140.

21 NRC at 1320 ¶ 342. The board concluded:

363. Based on the evidence developed for this contention, the Board believes as it stated in the conclusion finding of LEA Contention 12, the human response assumptions underlying these plans are reasonable, i.e., that in an emergency individuals show a willingness to perform their duties and do not abandon their roles when they have a clear understanding of these roles. FEMA testified that procedures had not yet been developed to provide reasonable assurance that adequate numbers of bus drivers will be available during a radiological emergency. FEMA's conclusion was based on plans submitted in December 1983. Bd. Edgs. 337, 531. However, we note that the record addresses facts that took place subsequent to FEMA's review. The Board's findings and conclusion in LEA 11 and 12 lend support to our findings in LEA 15. With sufficient buses (Bd. Edg. 216) and the demonstrated history of human response in an emergency (Bd. Edgs. 139, 141, 143-145, 240-244), the Board is satisfied that there is no merit to Contention LEA 15. Based upon this record, we find that there is reasonable assurance that adequate provisions are being made to assure availability of bus drivers and there will be a sufficient number of bus drivers willing to participate in response to an emergency at Limerick.

21 NRC at 1326 ¶ 363. The issue of availability of bus drivers was remanded by ALAB-836, 23 NRC 479 (1986), Commission review declined, July 24, 1986. The Appeal Board found a deficiency only with regard to the number of drivers for two school districts. LBP-86-31, 24 NRC 451, 463 (1986). The licensee arranged to maintain a pool of 200 or

more utility company bus drivers, and on remand the licensing board found this acceptable. Id. at 472.

The adequacy of school bus drivers was also litigated in Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant), LBP-85-27A, 22 NRC 207, 227-29 (1985), aff'd, CLI-87-1, 25 NRC 1 (1987). Intervenors' contention said that half the school bus drivers were high school juniors and seniors as young as 16 and a half years old and could not be trusted to perform in emergency situations. Id. at 227. The applicants filed for summary disposition, arguing that the emergency tasks of the school bus drivers would be little different from the tasks they competently performed daily during the school year, that they would be well-informed about what would be expected from them in an emergency, and that there is no evidence in the historical record of emergency response to suggest that high school students would not perform their assigned roles. Id. at 227. Despite the opposition of the Intervenors, the Board granted summary disposition in the applicants' favor. Id. at 227-29.

Another contention in Shearon Harris focused on whether adult school bus drivers in a "role strain" situation would "subordinate their driving duties to family obligations." Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant), LBP-85-49, 22 NRC 899, 915 (1985), aff'd, CLI-87-1, 25 NRC 1 (1987). This contention was litigated in an evidentiary hearing, but the intervenors elected not to file findings on it, and it was dismissed. 22 NRC at 915.

Finally, role conflict is being litigated in the Seabrook case. See, e.g., the written Testimony of Donald J. Zeigler, James H. Johnson Jr., and Stephen Cole, Doc. No. 50-443-444-OL, at 36-54 (Sept. 14, 1987).

In short, the role conflict issue has been litigated in several proceedings, with much the same evidence on both sides being presented each time. Never has it been found to be a significant problem.

2. Earlier Record in this Case

The Board views the evidence on the remanded issue in light of the earlier record on role conflict in general and role conflict of other emergency workers and auxiliaries. There is an extensive record from the 1983-84 hearings, for example, on the general theory of role conflict. See PID, 21 NRC at 671-73.

In the 1983-84 hearings, no witness reported that he had seen or heard of an actual case of true role "abandonment". See Tr. 1237, 1239, 1243, 1268, 1283 (Dilworth), 3167 (Smith), 3130, 3133, 3167-68 (Smith, Rossi), 3138, 3169, 3185-86 (Jeffers), 1399-1400 (Erikson) (no empirical evidence about role abandonment by people who had roles in an established emergency plan), 1171-72 (Weismantle, Cordaro) (no cases of role abandonment in storm restoration); 1237, 1239, 1243, 1261, 1265, 1268, 1283 (Dilworth) (no failure of police to respond, though it is difficult to reach off-duty officers), 3185-86 (Jeffers) (teachers asked supervisor to cover for them), 3111 (Smith) (checked on his family by phone), 3130 (Rossi) (staff worked to get everything done in past emergencies), 3133 (Rossi) (bus drivers refused to pick up children because roads were too bad), 3167-68 (Rossi) (drivers report in sick on snowy days and sometimes miss work or have to leave because of family problems), 3169 (Jeffers) (absenteeism in bad weather). The closest the County's witnesses came to a real-life example was a single case of a bus driver who attended her own child first after an accident. Tr. 3166 (Smith). This was not role "abandonment," strictly speaking, since attending her own child was part of her bus driver role.

Thus, as LILCO said in its 1984 proposed findings:

45. It is not going too far to sum up the record on role abandonment by saying that, of the witnesses who appeared in this proceeding, no one has seen it happen, no one has heard of it happening, no one has done it, and no one thinks he will do it in the future. There is no evidence that "role conflict" has ever rendered an emergency response ineffective. Tr. 914 (Mileti), 918-20 (Dynes), 1135 (Sorensen); Cordaro et al. ff.

Tr. 831, at 28. No witness had ever seen "role conflict" make an emergency response ineffective. Tr. 3114 (Muto), 3094 (Petrlak), 3128, 3133 (Rossi), 1237, 1239, 1243, 1268 (Dilworth), 1171 (Weismantle, Cordaro). No one knew of any case where it had. Tr. 1399-1400 (Erikson), 3147, 3186 (Jeffers). No witness had himself ever abandoned his duties in an emergency. Tr. 1249 (Dilworth), 3111 (Smith), 3136 (Rossi), 3147, 3187 (Jeffers), or thought he would in the future, Tr. 3113 (Muto), 3147 (Jeffers); Doremus, ff. Tr. 9491, at 9.

LILCO's Proposed Findings of Fact and Conclusions of Law on Offsite Emergency Planning, at 27-28 (Oct. 5, 1984).^{14/}

In 1983 LILCO's witnesses explained that role conflict has not been extensively studied because it has never appeared to professional researchers in the field as a problem worth studying.^{15/}

Some scholars study emergencies after they happen and try to reconstruct what they think happened at the time. By contrast, there are researchers who have focused research on actual behavior in emergencies with long research experience in a wide variety of emergencies, such as the Disaster Research Center and the Natural Hazards Group in Colorado. Researchers who have had extensive experience in observing emergency behavior (Quarantelli, Dynes, and Drabek) have indicated that role conflict is a non-problem.

Cordaro *et al.*, ff. Tr. 831, at 41-42. See also Tr. 923 (Mileti) (problems created by the loss of personnel have "not been evident in other emergency situations"), 1135 (Sorensen) (since role abandonment really has never occurred in disasters that have

^{14/} Recently Dr. Brodsky, a school superintendent, became the first Suffolk County witness to suggest that he himself would abandon the school children in his care. Tr. 20,406 (Brodsky). The Board does not believe Dr. Brodsky would in fact abandon the children; as this proceeding has shown, preemergency statements of intention are quite unreliable.

^{15/} LILCO's witnesses acknowledge that role "conflict" will occur in an emergency, as it does in everyday life. Tr. 19,512-13, 19,539 (Mileti). They admit it may cause anxiety during an emergency. But the issue is whether role conflict will cause bus drivers to abandon (or delay in performing) their roles.

been studied, we really had no basis for speculating on what the potential causes of it would be), 1018 (Dynes) (in looking over the interviews, and they were coming in from a wide variety of disaster events, the whole notion of role conflict being a problem for emergency organizations simply didn't hold up^{16/}), 919 (Dynes) (this is a case of asking for evidence of a "non-problem").

LILCO's witnesses also explained, both in their (unheard) Phase I testimony and at the hearings in 1983, about the "emergency consensus," which is a temporary "shift in values" that gives the highest priority to protection for threatened people. Cordaro *et al.*, ff. Tr. 831, at 19; PID, 21 NRC at 674.

Finally, LILCO's witnesses explained that people can perform more than one role at a time:

"Conflict" implies equally weighted contradictory alternatives, requiring a person to choose one role to play while abandoning another. This condition is rarely, if ever, found in actual social life.

Cordaro *et al.*, ff. Tr. 831, at 10 (emphasis in original).

The Board concluded in 1985 that role conflict "will not be a significant problem at Shoreham." PID, 21 NRC at 679. The Board is now asked to determine whether school bus drivers are different in this respect from all the other groups for which role conflict has been litigated.

C. The (Alleged) Problem Defined

In 1983 LILCO's witnesses testified that "most of the examples used to illustrate role conflict are based on classic stereotypes of family life that are, in reality, quite

^{16/} Dr. Lindell has had the same experience as the DRC: when he talked to people who had been in evacuations, no one volunteered that they had experienced role conflict to the degree that it resulted in role abandonment. Tr. 19,439 (Lindell). See also Crocker *et al.*, ff. Tr. 19,431, at 48 (Lindell) (people associated with offsite preparedness have reacted with surprise to indignation to suggestion of role conflict).

atypical." Cordaro et al., ff. Tr. 1470, at 14 (Dynes, Mileti). They explained this as follows:

The classic stereotype postulates the following hypothetical family and social situation: an employed (and competent) male whose place of employment is separated from the location of his unemployed (and incompetent) wife, who is with their small (and anxious) children. The family's location is in potential danger. This isolated family segment is presumed to lack alternative sources of immediately available support, such as kin or neighbors. Further, it is presumed that there will be a lack of communication lines, thus making it impossible for the husband to obtain knowledge about the safety of the rest of the family while on the job. Finally, it is presumed that the employee-husband has a vague and perhaps inconsequential emergency responsibility.

From this mix of assumptions, one might prophesy that the strong, competent husband might leave his post and go home to take care of his family, or delay doing anything, until he somehow was personally assured that his wife and children were being taken care of. . . .

Moreover, there are several other factors that make this situation more hypothetical than real. In the first place, families with an employed male and unemployed wife with small children at home constitute only about 13 percent of American families according to the 1980 census. This suggests that the family system visualized in the classic "role conflict" example is an atypical living arrangement.

Cordaro et al., ff. Tr. 831, at 14-15 (Dynes, Mileti).

Now the Intervenors offer a theory based upon a different stereotype. They point out that many of the regular school bus drivers are women. See Brodsky et al., ff. Tr. 20,259, at 10, 15, 17, 47, Tr. 19,533 (Mileti), 20,143 (Crocker), 20,354 (Smith).^{17/} They then postulate that many of these women will have family members (presumably helpless ones) at home. Finally, they reason that the bus driver will attend to those family members before driving her school bus.

^{17/} See also, in the earlier record, Tr. 1271 (Cole) (great majority of bus drivers are women), 3167 (Smith) (about 95 percent of drivers in one school district are women).

Suffolk County's school administrator witnesses emphasized how responsible, carefully selected, and well-trained their regular school bus drivers are. For example, the Director of Transportation for Middle Country Central School District personally interviews and approves each driver. Brodsky *et al.*, ff. Tr. 20,259, at 8. He looks for the "composure and capability to gain the confidence and respect of children and parents." *Id.* at 9. Among other requirements, each bus driver for that District must submit three letters of reference and undergo fingerprinting to verify that she does not have a criminal record. *Id.* at 9. Bus drivers for the District then undergo 40-50 hours of instruction. *Id.*; see also *id.* at 15 (Riverhead Central School District), 18 (Longwood Central School District), 20 (Superintendent of East Meadow Union Free school District personally approves drivers), 21, 22 (Superintendent of Mt. Sinai School District personally approves drivers; Transportation Director personally interviews every driver); 23-26 (extensive supervised on-the-job training for all drivers, including biennial refresher courses and additional meetings), Tr. 20,344-50 (Doherty, Koenig, Rossi), 20,352-53 (Rossi). As a result, the drivers take their jobs seriously, or else they are removed from duty. Tr. 20,353 (Smith). The Board has already found that regular school bus drivers are expected to drive school buses in an evacuation of school children. PID, 21 NRC at 859.

Also, the drivers are assigned to drive the same routes every day so they "can learn who the children are on their bus, and hopefully develop a first name relationship with the kids." Tr. 20,353 (Smith). One witness indicated that the school district strives for a "feeling of family on that bus." Tr. 20,354 (Suprina). The mostly women drivers do a "terrific job." Tr. 20,354 (Doherty). "The rapport that drivers establish with children going to school on an everyday basis is sound and it is strong." Tr. 20,403 (Suprina). But the school administrators argue that this rapport does not "override" commitment to family. *Id.*

If the woman bus driver's concern is an adult member of her family who is disabled or lacks an automobile, see Tr. 19,536 (Mileti), the Board notes that LILCO has provided ambulettes to evacuate the homebound handicapped and buses to evacuate people without their own cars. PID, 21 NRC at 849-55, 817-32. LILCO has also provided a means for identifying in advance people who need assistance. PID, 21 NRC at 847. It is also likely that homebound adults could be evacuated by friends, neighbors, or family members other than the school bus driver.^{18/}

Of more concern to the intervenors appear to be the bus driver's children. If the children were in school in the EPZ, then presumably they would be evacuated with their schoolmates by bus.^{19/} It is postulated, however, that the bus driver might have children at home rather than in school. The intervenors' concern therefore appears to be children who are too young for school or who are home sick and yet are left alone without adult supervision. See Tr. 19,534-35 (Mileti). It is unlikely that a school bus driver, who as noted above is likely to be a responsible person, would leave preschool children

^{18/} In the Indian Point proceeding FEMA witnesses testified that disaster history has shown that friends and relatives will assist special populations, such as latchkey children, during an emergency. Consolidated Edison Co. (Indian Point, Unit Nos. 2 & 3), LBP-83-68, 18 NRC 811, 994 (1983). There New York State witnesses expressed the view that "relatives and friends should recognize that the total burden of protecting special populations cannot be borne by government." Id. at 992, 996.

In Commonwealth Edison Co. (Braidwood Station, Unit Nos. 1 & 2), LBP-87-13, 25 NRC 449, 454 (1987), the board found that, while the applicant's program clearly depended on some degree of cooperation among friends, relatives, and co-workers that was beyond its ability to control, there was nothing in the record to suggest that such reliance was unreasonable.

^{19/} The intervenors suggested that school bus drivers might abandon their jobs to pick up their own children at school. The alleged problem of parents going to the schools to pick up their children was litigated and resolved in 1983-84. See PID, 21 NRC at 866. Then the contention was that parents, upon notification of an early dismissal, would depart for the school to collect their children. The Board found "no evidence or basis to believe that this activity will be of such a magnitude as to result in significant disruption of early dismissal." Id.

unattended. Tr. 19,535, 19,538 (Mileti). As a Suffolk County witness said, bus drivers with preschool children "make other arrangements, I assume, for the care of their children while they are driving." Tr. 20,354 (Koenig). Even assuming that the female bus driver had left her preschool child at home unattended, one would expect that friends, neighbors or other family members might help the child evacuate.

In short, the Intervenors' concern is based on a very implausible scenario or on the argument that bus drivers would abandon their jobs to be with members of their family even though that might not, strictly speaking, be necessary. This concern is highly speculative and contrary to the evidence. Very few bus drivers are likely to leave small children unsupervised. As for the claim that they will join their families whether or not the families need them to help evacuate, this appears to be another version of the Intervenors' theory that people are so afraid of radiation that they will behave irrationally. See Cole et al., ff. Tr. 20,672, at 18 (citing high level of fear of radiation that Long Islanders have). The Board has already rejected this theory. See PID, 21 NRC at 667, 669-71.

If a school bus driver did have helpless dependents, there are a variety of ways that she might resolve her role conflict.^{20/} She might arrange for another family member or a neighbor to evacuate the children, or she might even take the children with her on the school bus, Tr. 19,535 (Mileti), although Suffolk County witnesses testified that there is a rule against this, Tr. 20,354 (Koenig), 20,404-05 (Smith). The evidence shows that school bus drivers in actual emergencies have resolved their role conflict this way. Crocker et al., ff. Tr. 19,431, at 30, 31. LILCO's witnesses point out

^{20/} As the DRC data presented in 1983 show, people sometimes call home, engage in on-the-job search activity, or even leave their jobs temporarily to check on their families. See Tr. 1035, 1039-40 (Dynes).

that the reason that role abandonment is not usually a problem in emergencies is that there are many ways to resolve "role conflict" other than abandoning one of the roles. This evidence comports with common sense.

Suffolk County's sociologists acknowledge that people may try to resolve role conflict by attempting to perform both roles, but they say that this approach "is often counter-productive, with the result that both roles are performed poorly, if at all." Cole et al., ff. Tr. 20,672, at 13. They cite no actual cases.

As individuals have ways of resolving role conflict, so organizations have ways of adjusting to the absence of workers. For example, school bus companies have extra drivers. See Tr. 20,342-43 (Doherty). One school district plans to use teacher volunteers to drive buses if there is a shortage of drivers in an emergency. Tr. 9544, 9547 (Doremus).

Thus, it appears at the outset that role conflict is, as Professor Dynes testified in 1983, a "non-problem." Indeed, LILCO witnesses in the most recent hearings confirmed earlier testimony that role conflict is not a real problem. See Crocker et al., ff. Tr. 19,431, at 48 (Lindell); Tr. 19,435, 19,480, 19,481 (Kelly) (role conflict was never really an issue in other cases), 19,439 (Lindell) (no indication in the literature that role conflict was a problem), 19,539 (Mileti) (Long Island is the only place people have tried to address role abandonment in putting emergency plans together). Dr. Mileti classes role abandonment as one of the "myths" about emergencies that many people believe, Tr., 19,538-39, 19,636-37 (Mileti), like looting and panic, Tr. 19,541-42 (Mileti).^{21/}

Nevertheless, assuming for the sake of argument that a fast-breaking Shoreham emergency found many regular bus drivers^{22/} with loved ones dependent on them, the

^{21/} See also Cordaro et al., ff. Tr. 1470 (shadow phenomenon), at 14, 17 (panic).

^{22/} The role conflict issue on remand involves only regular school bus drivers, not LERO school bus drivers. Role conflict of LERO workers was fully litigated in 1983-84

Board has weighed the evidence on both sides. The Board sees the weighing of the evidence as having two parts. First, both sides have a theory. Second, both sides have empirical data. We take each of these two parts of the case in turn.

D. Theory

LILCO's witnesses testified, first in 1983 and then in 1988, that emergency workers do their jobs if role clarity exists -- that is, if the workers understand that they have a role and what it is.^{23/} See Tr. 19,507 (Mileti).^{24/} One of the purposes of having emergency plans is to produce this role clarity.^{25/} One way^{26/} it is imparted is by training.^{27/} Another is by having emergency workers do in an emergency the same thing they do every day^{28/}; bus drivers are likely to know they have a role in an

(footnote continued)

and not remanded. See PID, 21 NRC at 674, 675, 676-77. No evidence was presented that LERO school bus drivers are different from other LERO workers.

^{23/} This time around LILCO added a psychologist, Dr. Lindell, to its panel. He cited a line of research on "bystander intervention" suggesting that people in general, including regular school bus drivers, would be motivated to help school children in a radiological emergency. Crocker et al., ff. Tr. 19,431, at 18-22.

^{24/} Similarly, an NRC Staff witness testified in 1984 in connection with the "conflict of interest" contention that the important consideration is for emergency workers to understand the concept of "responsibility." Tr. 15,211-12 (Sears).

^{25/} Tr. 1136, 1146 (Mileti).

^{26/} LILCO's witnesses have always said that training is only one of the means by which role clarity can be achieved. Crocker et al., ff. Tr. 19,431, at 15; see also Tr. 1110 (Mileti) ("One way they can gain that certainty [about their emergency role] is through training"), 1146 (Mileti) ("The whole point of emergency planning is to make it clear to emergency workers that they have a certain understood emergency role and that's the point of training. And that objective could be achieved through other mechanisms besides training . . .").

^{27/} Tr. 1137 (Weismantle), 1109-10 (Mileti), 939 (Sorensen).

^{28/} See Tr. 1145-46 (Mileti).

emergency because of the "normative overlap" between their ordinary jobs (driving children to and from school) and their emergency jobs (driving children from school). Crocker et al., ff. Tr. 19,431, at 15 (Mileti); see also Tr. 19,499, 19,650-52 (Lindell), 19,509-10, 19,565, 19,971, 19,980-81 (Mileti).

JILCO's witness testified that, of all the groups involved in an emergency, the ones least likely to have problems of role abandonment would be school bus drivers:

I feel confident in saying that of all the role conflict, role abandonment, roles we could be arguing the one to be least concerned about in my opinion is getting children out. If there were species of humans who didn't care about children, they would die out.

Tr. 19,567 (Mileti). Evacuating school children is raised to a very high priority in emergencies. Tr. 19,529 (Mileti). It will occur to school bus drivers that they have a role because they are the very ones who deposited the children in the risk area in the morning, with the expectation that they would pick them up later. See Tr. 20,188-89 (Lindell). As noted above, a County's school administrator witness testified that the drivers drive the same children each day and, it is hoped, get to know them on a "first name" basis. Tr. 20,353 (Smith).

In contrast, Suffolk County's witnesses say that "the sociological literature demonstrates that in our society, family roles tend to be the most important." Cole et al., ff. Tr. 20,672, at 14 (emphasis in original). The County expert witnesses predicted that "a very large number" of school bus drivers would attend first to their families:

It is also our opinion that a very large number of them would choose to attend first to the safety and needs of their families. Only after they had fully satisfied themselves that their families were safe — which in this case means out of the area at risk — would they be willing to perform their bus driving functions, if they ever would at all. This will have negative consequences for the rapid evacuation or early dismissal of school children from the schools.

Cole et al., ff. Tr. 20,672, at 17-18. This opinion, as the witnesses candidly admit, is based on factors in the literature, as applied to bus drivers. Id. at 18. Nowhere in the County's testimony is there documented an actual case of role abandonment.

In weighing the opinion evidence, the Board gives more weight to LILCO's witnesses. The school administrators who testified for Suffolk County are experts in operating schools but not experts in human behavior and certainly not in human behavior in emergencies.^{29/} See Brodsky et al., ff. Tr. 20,259, Attachments 1-8.^{30/} The County's three sociologists are experts in sociology, and two of them, Professors Barton and Turner, have published works on emergencies.

Of Suffolk County's witnesses, Professor Cole is not an expert on disasters at all. Professor Barton published his last work on disasters in 1969. Cole et al., ff. Tr. 20,672, Att. 3, at 4. He has not done field research on disasters. Tr. 20,678 (Barton). Professor

^{29/} In this respect the school administrators are at best fact witnesses, not expert witnesses. Cf. Suffolk County Objections to Prehearing Conference of Counsel Orders and Motion for Reconsideration at 14-15 (Dec. 8, 1983) ("The school teacher witnesses are, as pointed out at the Conference of Counsel, fact witnesses. Their testimony concerns facts based on their personal knowledge and experiences.") Presumably the school administrators are offered in the same light.

See Texas Utilities Elec. Co. (Comanche Peak Steam Elec. Station, Units 1 and 2), LBP-84-35, 20 NRC 1646, 1651 (1984) (giving no weight to testimony of nonexperts in metallurgy); Philadelphia Elec. Co. (Limerick Generating Station, Units 1 and 2), ALAB-819, 22 NRC 681, 733 (1985) (refusal to let retired art therapist testify on pipeline location and accidents was proper); Florida Power & Light Co. (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-86-23, 24 NRC 108, 116 (1986) (weight to be accorded expert witness's testimony was influenced by the fact that he was a mathematician with little expertise in engineering); Public Service Elec. and Gas Co. (Hope Creek Generating Station, Units 1 and 2), LBP-78-15, 7 NRC 642, 687 (1978) (witness could not be accorded as much weight as an expert who is reporting results from careful and deliberate measurements).

^{30/} One of the school administrators has a bachelor's degree in political science/psychology. Brodsky et al., ff. Tr. 20,259, Att. 7, at 1. He testified that he teaches courses dealing with role conflict. Brodsky et al., ff. Tr. 20,259, at 6. It appears, however, that these have nothing to do with behavior in emergencies. Tr. 20,261-68, 20,271-78 (Koenig).

Turner's research has dealt mostly with "anticipations of disaster." Tr. 20,677 (Turner). He, too, has not collected systematic data at the scene of a disaster. Tr. 20,677 (Turner). Cf. Crocker et al., ff. Tr. 19,431, at 2-8 and Att. C and D. The Board concludes that LILCO's expert witnesses are better qualified to address role conflict.

Both sides made reference to the literature on disasters. For their analysis of the literature, the Intervenor's witnesses rely almost entirely on articles and books written in 1969 or earlier. See Cole et al., ff. Tr. 20,672, at 27-40. Of this older literature on emergency behavior, a notable example is a 1969 book entitled Communities in Disaster by Suffolk County's witness Professor Allen Barton. This book was identified by LILCO's witnesses in 1983 as a discussion of what they called the "first generation" of such literature. Cordaro et al., ff. Tr. 831, at 52, 58; see Tr. 19,552-53, 19,566 (Mileti). One of the early cases cited as an example of role conflict was the Texas City fire, where workers' homes were next to the dock area where the ship exploded, and the workers could see that their own homes had caught fire. Crocker et al., ff. Tr. 19,431, at 23. However, even at Texas City:

In Texas City, most of the refinery workers stayed on the job until their units shut down as they had been trained to do (Killian 1952, page 311).

Tr. 1339 (Erikson).^{31/} The Intervenor's presented no literature references in the most

^{31/} It is obvious that the pre-1969 reports of role abandonment must be viewed with caution. For example, in their 1984 proposed findings the Intervenor's relied on a study of Hurricane Audrey by Fred Bates (1963). They cited Tr. 990-995, where Dr. Mileti explained that he had spoken with the author of the paper and learned that there were only three emergency workers in the community studied and "those three emergency workers stayed on the job, did their work." Tr. 993 (Mileti).

Likewise, in 1984 the Intervenor's cited an article by Fritz (1961). The passage relied on by Intervenor's, however, said that "separation anxiety" may persist and cause considerable stress for "people with clearly defined disaster jobs." LILCO Ex. 4, ff. Tr. 1334, at 205; Cordaro et al., ff. Tr. 831, at 65.

recent hearings that were not discussed in the 1983 hearings. They did cite a 1987 publication by Russell Dynes (also cited by LILCO), but this was based on the DRC interviews that were cited in LILCO's "Phase I" testimony and then discussed in detail in the Phase II hearings in 1983. See Cole et al., ff. Tr. 20,672, at 37-39.

In contrast, the Applicant's witnesses rely primarily on articles published since 1969. Crocker et al., ff. Tr. 19,431, at 9-15. So far as the record shows, the literature since 1969, with the exception of a single article by Dr. James Johnson (a former witness for Suffolk County in this case), clearly supports LILCO. Indeed, most of it was written by LILCO's witnesses. See Crocker et al., ff. Tr. 19,431, at 9-15. Moreover, Dr. Miletì has attempted to reconcile the early literature with the more recent, see Tr. 19,634-35 (Miletì), whereas the Intervenors have attempted primarily to critique LILCO's 1983 testimony on the early literature. If the Board were to decide this case solely on the literature alone, then, it would be compelled to decide in favor of LILCO.

E. Empirical Data

However, as LILCO points out, the test of the scientific theory is found by resort to empirical data.^{32/} Crocker et al., ff. Tr. 19,431, at 24. This is the scientific method. See Tr. 19,568 (Miletì). LILCO therefore urges the Board to look at the empirical record to determine whether role conflict is likely to be problem in a radiological emergency. Crocker et al., ff. Tr. 19,431, at 24.

^{32/} "[W]hatever is not deduced from the phenomena is to be called an hypothesis" (Isaac Newton, in a letter to Robert Hooke of February 5, 1675/1676). Courts excluding expert opinion for lack of basis often note that it is speculative or without any factual foundation. Agent Orange Product Liability Litigation, 611 F. Supp. 1267, 1281 (D.C. N.Y. 1985), citing Merit Motors, Inc. v. Chrysler Corp., 569 F.2d 666 (D.C. Cir. 1977), affirming a grant of summary judgment despite opinion by an opposing expert that was, in the trial court's opinion, "based solely on speculations and hypotheses." 569 F.2d at 672.

But the parties differ fundamentally on what empirical data should be used. Simply stated, the Intervenor's witnesses believe that the Board should rely on polls of what people think they would do in a future radiological emergency. LILCO believes that the Board should rely on the historical record of actual behavior in actual emergencies, both radiological and nonradiological.

The Board will first discuss opinion polls and then turn to the historical record of real emergencies.

1. Opinion Polls

The empirical evidence for the Intervenor's consists of opinion polls taken by Dr. Stephen Cole. See Cole et al., ff. Tr. 20,672, at 40-58. In the 1985 PID the Board found as follows:

The Board finds that the actual behavior of any particular bus driver during an emergency would be influenced by the specific conditions existing at that time. Thus, the school bus driver survey cannot predict what drivers will do at the time of an accident. Id. at 8-9; Cordaro et al., ff. Tr. 831, at 35. People behave differently in an unfamiliar situation from the way they say they will when speculating about their future behavior. Tr. 1085 (Mileti). The Board agrees with Dr. Mileti's conclusion that opinion polls are very poor predictors of behavior in an emergency. Tr. 1166 (Mileti). See also Board Finding I.A. Even if we assume the survey has some predictive value, it does not suggest a massive defection of drivers because only 3% said they would immediately leave the evacuation zone. Cordaro et al., ff. Tr. 831, at 34-35.

PID, 21 NRC at 676. Although we understand the Appeal Board's concern that, as an evidentiary matter, a poll of firemen would provide insight into school bus drivers (ALAB-832, 23 NRC at 153), we find no more reason now than in 1985 to conclude that polls can predict emergency behavior. Indeed, the Intervenor's presented no additional evidence on that point, unless the same opinion of two new County witnesses be counted as such.^{33/} If, as the evidence indicates, the key to role performance is role

^{33/} See, e.g., Tr. 20,679 (Barton) ("surveys don't produce precise, numerical accuracy with respect to future behavior, but they produce broad findings which allow you to anticipate the overall consequences").

certainty, then it is hard to give much credence to a poll of volunteer firemen who have no role in the LILCO emergency plan and were simply asked to assume one for the poll. In contrast, the Board agrees with LILCO that regular school bus drivers who had taken children to school in the morning and who are expected to pick them up in the afternoon (and in the event of an early dismissal due to the weather, for example) would understand that they had a role picking them up for an evacuation.

In 1983 LILCO's witnesses testified that preemergency statements of intention, such as those provided by polls, cannot predict actual emergency behavior, because it is determined by "situational" perceptions of risk at the time of the emergency. Tr. 1085-86, 1164, 1121-22 (Mileti).^{34/} In the reception centers hearing last summer Professors Mileti and Lindell again testified that behavioral intentions are an unreliable predictor of actual emergency behavior. See LILCO Ex. 1 (Crocker et al.) at 14, 15, 19; Tr. 17,772-73 (Lindell).^{35/}

^{34/} The LILCO witnesses' opinion that opinion polls do not accurately predict emergency behavior was well founded in the research literature. In their "shadow phenomenon" testimony Professors Dynes and Mileti said that since the first work was done on how well attitudes and behavior relate to each other (a 1934 paper by R.T. LaPierre), "the great majority of investigators who have looked at the question have concluded that there is only a weak relationship, if any, between attitudes and actual human behavior." Cordaro et al., ff. Tr. 1470 (shadow phenomenon), at 69. The LILCO witnesses then reviewed a whole series of papers, both for and against their position: Wicker (1969), Kiesler and Munson (1975), Dillehay (1973), Kiesler et al. (1969), Rokeah and Kliejunas (1972), Wicker (1971), Fishbein and Ajzen (1975), Snyder and Swann (1976), and Piccolo and Louvier (1977). See Cordaro et al., ff. Tr. 1470, at 69-76.

^{35/} LILCO witnesses have always acknowledged that sometimes polls to predict voter or consumer behavior are successful. Tr. 1165-66 (Mileti), 17,772 (Lindell). But polls are very poor predictors of emergency behavior. Tr. 1166 (Mileti).

Even with respect to polls of voters, Suffolk County witness Dr. Cole testified as follows:

There are other reasons why there can be differences
between results indicated by an election poll conducted a

(footnote continued)

Indeed, there is evidence that using opinion polls for planning as the Intervenor propose can be harmful. See Tr. 1087 (Mileti) (it's dangerous to use people's speculations about behavior to predict behavior). Dr. Mileti explained why:

40. Q. Suffolk County's witnesses argue that emergency planners should use opinion polls in planning. What is your opinion?

A. [Lindell, Mileti] If we accept their thesis, we conclude that planners should provide more personnel than are necessary to carry out an emergency response because a large percentage of personnel will not be available because of role conflict. But the empirical fact, demonstrated in many past emergencies, is that there is often an oversupply of personnel. See Cordaro *et al.*, ff. Tr. 832, at 17.

[Mileti] That is why I have advised against using opinion polls, at least in the way Suffolk County urges, for emergency planning. It is not just that they are unreliable; they are harmful. If believed, they focus the planner on the wrong problem — indeed on a hypothetical problem that is the opposite of what actually happens in emergencies.

(footnote continued)

week before the election and the actual results of the election. For example, some voters can change their minds about who to vote for in the last week, particularly in this election, that you are referring to, where there were three candidates and Javits never showed a very high proportion. Some of his supporters, at the end, could have felt that voting for Senator Javits would have been wasting their vote and could have switched to one of the other two candidates, so I don't believe the discrepancy between the poll data and the actual outcome says anything about whether the poll was right or wrong.

Tr. 2798-99 (Cole). Put another way by LILCO witnesses, behavioral intentions obtained, for example, through public opinion polls, cannot be used to accurately predict responses, because a host of factors present at the time action is taken can influence behavior to make it inconsistent with an attitude reported in a poll. Cordaro *et al.*, ff. Tr. 1470, at 71; Tr. 1940 (Richardson); see Cole, ff. Tr. 2792, at 30.

Crocker et al., ff. Tr. 19,431, at 46-47. Cf. Tr. 20,180 (Kelly) (at Mississauga too many doctors and nurses reported to the evacuating hospital and too few to the receiving hospital); Crocker et al., ff. Tr. 19,431, at 13-14 (about twice as many people show up to evacuate nursing homes and hospitals as there are people who need to be evacuated); Tr. 17,666 (Linnemann) (reception centers hearing) (people in the field of radiation welcomed the opportunity to help at Three Mile Island; the problem wasn't that there weren't enough people but that there wasn't an organization into which to fit their talents and use them expeditiously).

The Intervenor continue to insist that opinion polls can predict future behavior, though they disclaim precise numerical predictability. The Intervenor have made Dr. Cole's surveys the centerpiece of their evidence on shadow phenomenon and role conflict in 1983-84, on credibility in 1984, on the exercise results in 1987, on the reception centers in 1987, and now on role conflict again in 1988. The Board has already concluded in this case that "poll results have no literal predictive validity." LBP-85-12, 21 NRC 644, 667 (1985); see also id. at 655-71.^{36/} More recently the Board has held that Dr. Cole's polling techniques tell only what the situation is now, not what it will be at some undetermined future date.^{37/} Partial Initial Decision on Suitability of Reception Centers, Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-88-13, 27 NRC ____, slip op. at 24 (May 9, 1988), notice of appeal filed May 20, 1988.^{38/}

^{36/} The Board's reasoning was that the public, in an actual emergency, would have additional information that respondents would need to determine their actions in an emergency. The Board therefore gave little weight to the predictive findings of public opinion polls. 21 NRC at 655-71. This finding passed Appeal Board review and the time for Commission review and has become final agency action.

^{37/} FEMA does not consider the County's polls to be a reliable data base from which to estimate the number of people who might be concerned about contamination. Tr. 18,324 (Keller).

^{38/} In Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-88-2, 27 NRC 85, 174 (1988), the Frye Board found it unnecessary to consider Dr. Cole's survey data.

There is no reason to change that opinion now.^{39/}

Dr. Mileti testified a second time^{40/} about an elaborate study of behavioral intentions that he had done in which he attempted to predict how people would behave in response to a scientifically reliable prediction of an earthquake in California. Cordaro et al., ff. Tr. 1470, at 81; Tr. 1103-05 (Mileti); Crocker et al., ff. Tr. 19,431, at 40-42. He and his coworkers predicted large social and economic costs. When a subsequent "near-prediction" of an earthquake occurred in California, one of the Intervenor's witnesses, Dr. Turner, studied the results and found none of the results that Dr. Mileti had predicted. No doubt there were many differences between the scenarios used in Dr. Mileti's study and the actual near prediction that occurred; Dr. Mileti admits as much. But, as he says, that is precisely the point. The situation in an emergency would without question be quite different from any scenario created for a study. As Professor Cole testified, "[i]t would be impossible to ask people about the infinite variety of possible accidents which could happen." Tr. 20,675-76 (Cole).

On page 57 of his testimony in the most recent hearings Professor Cole says that school bus drivers do not have the "experience, training, or commitment of firemen" and therefore even more bus drivers would abandon their roles than firemen would. Yet if one compares his two 1982 polls, one of bus drivers and one of firemen, one finds that 69 percent of the bus drivers said that they would make sure their families were

^{39/} The view that polls of behavioral intentions can predict behavior is a minority view, as explained earlier in this proceeding. Cordaro et al., ff. Tr. 1470, at 69-76; Tr. 1817 (Dynes, Mileti).

^{40/} Dr. Mileti made the same point in 1983 testimony. Cordaro et al., ff. Tr. 1470, at 81; Tr. 1103-05 (Mileti). He testified that he was co-principal investigator of the largest "what would you do if" study he believed the National Science Foundation has ever funded, and that the report from that study clearly points out that one cannot predict human behavior from what people told the investigators they would likely do. Cordaro et al., ff. Tr. 1470, at 81.

safe first and that 68 percent of the firemen said so. These numbers are almost identical. Thus the difference in behavior that Dr. Cole postulates is not revealed by the survey results.^{41/} If, however, the survey results reflect current attitudes rather than future behavior, the results make sense. Drs. Mileti and Lindell postulated that the survey results measure attitude towards the utility or toward families, Crocker et al., ff. Tr. 19,431, at 43, and this interpretation seems borne out by the survey results.

Attempts to correlate the results of Dr. Cole's opinion polls with real-world either have been not been made or have been unpersuasive. For example, in the "shadow phenomenon" litigation the County argued that the actual behavior at TMI validated its opinion polls, relying on the similarity between the numbers at TMI and the numbers at Shoreham inside 10 miles. At the same time, the County argued that the disparity in results (outside 10 miles) showed that Shoreham is even worse than TMI. See Cordaro et al., ff. Tr. 1470 at 83-86.^{42/}

^{41/} In the firemen poll conducted six years later in 1988 a larger percentage of the firemen said that they would take care of their families first. There are no 1988 bus driver results to compare to this, however.

^{42/} As Figure 5 to Zeigler and Johnson, ff. Tr. 2789, between pp. 19 and 20, shows, the actual behavior at TMI was close to intended behavior as reported in the April 1982 survey on Long Island for people 0 to 5 miles and 5-10 miles from the plant, less close for people from 10-15 miles from the plant, and not close at all for people 15 to 25 and 25 to 40 miles from the plant. Dr. Cole concluded from these data that the surveys should be taken into account in part because "we find a high level of correspondence between what people on Long Island tell us they would do and what people at Three Mile Island actually did do." Cole, ff. Tr. 2792 at 28. But at the same time, Dr. Johnson explained:

Beyond the 10-mile zone, the [survey] results at Shoreham suggest an even larger evacuation shadow than at TMI. Specifically, within 10 to 15 miles of TMI, one-third of the population evacuated. At Shoreham, an estimated one-half of the population within the 10 to 15 mile zone is likely to evacuate. If one compares actual evacuation behavior at TMI and intended evacuation behavior at Shoreham beyond

(footnote continued)

Dr. Mileti and Dr. Lindell offer the alternate interpretation that Dr. Cole's polls are measuring not future behavior, but rather people's (favorable) attitudes toward their families or (unfavorable) attitudes toward the utility. Crocker et al., ff. Tr. 19,431, at 43. This view is supported by the fact that the same sorts of polls appear to elicit the same sorts of responses at places other than Long Island. For example, Dr. Johnson has done a poll of school teachers in California and found that nearly a third of them said that they would not assist in an emergency evacuation of schools. Crocker et al., ff. Tr. 19,431, at 14.^{43/} Large amounts of role conflict have been reported by Dr. Cole at Seabrook as well.^{44/}

Indeed, it is clear that people will say that their families come first. For example, one of the bus drivers interviewed in LILCO's survey apparently made such a remark. See Suffolk County Bus Driver Ex. 23 at 5. What this meant in practice,

(footnote continued)

15 miles of the plant (see Figure 5), one finds that within the 15 to 25 mile distance zone at TMI, only about 12 percent of the population evacuated; at Shoreham, approximately 33 percent of the population in this distance zone said they would evacuate. Outside the 40-mile zone, less than one percent of the people at TMI evacuated, but one-fourth of the population in this zone on Long Island said they would evacuate.

Zeigler and Johnson, ff. Tr. 2789, at 20.

^{43/} Similarly, when Dr. Cole did polls to determine whether there would be a large "shadow" evacuation around the Seabrook plant, he got results similar to what he found at Shoreham. Tr. 17,872 (Cole). Indeed, intervenors have used the fact that their polls consistently show large numbers of people saying they would evacuate to argue that fear of radiation and the resulting knee-jerk urge to evacuate are universal and relatively unchanging phenomena.

^{44/} See written "Testimony of Donald J. Zeigler, James H. Johnson Jr., and Stephen Cole . . .," Sept. 14, 1987, in Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), Doc. No. 50-443-444-OL, at 36-54.

however, was merely that she was delayed about 15 minutes while she helped her family evacuate before reporting for duty. Tr. 20,185 (Kelly).^{45/}

2. Past Emergencies

Denying the value of opinion polls to predict emergency behavior, LILCO's witnesses emphasize the record of actual behavior in past emergencies. Dr. Mileti summarized the Applicant's position in these words:

To the best of my knowledge, I know of no case in the history of this country, and I mean from 1776 forward, where anyone has left school children on the curb whether or not there was emergency planning.

Tr. 19,529-30 (Mileti). We turn now to the Applicant's empirical data, which consists of a number of studies of actual past emergencies.

a. DRC Data

First, Professor Dynes has testified in this proceeding,^{46/} and published in 1987,

^{45/} As noted above, the Diablo Canyon board found that a sociological survey of emergency workers was not necessary. 16 NRC at 805 ¶ 46. Similarly, in Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant), LBP-86-11, 23 NRC 294, 389 (1986), the board found that a poll of whether people would warn their neighbors was not very reliable.

^{46/} The DRC interviews were addressed in considerable detail at Tr. 1012-53 (Dynes). The DRC did not set out to study "role conflict," because role conflict has never seemed to be a real problem to researchers who studied real emergencies. See Tr. 1015, 856, 918 (Dynes). The DRC was founded to create a research tradition in the study of disasters. Tr. 852, 1151 (Dynes). Thus, the DRC researchers went to actual emergencies, often during or shortly after the impact, and studied how people behaved. They compiled a vast body of data, amounting to some 5,000 interviews from 150 disasters over a period of 10 years. Tr. 1018 (Dynes).

One of the things that became obvious to the researchers over the course of this research experience was that role conflict was not a problem. Tr. 880, 918-19 (Dynes). In all cases, the emergency organizations continued to function. In many cases there were too many people, for some people who were not on shift reported even though they were not expected to. Tr. 1040-41 (Dynes). The DRC researchers were not taking a poll to find out who would confess to abandoning his job; they were trying to find out what happens in emergencies. Thus they talked to people in charge who would be familiar with whether or not they had a shortage of personnel; in addition, they talked

(footnote continued)

his finding that, in over 6,000 interviews by the Disaster Research Center, he had found no instance where the functioning of an emergency organization was undercut by personnel not reporting to duty. See Crocker et al., ff. Tr. 19,431, at 11-12; Tr. 19,527-28 (Mileti); see also Cordaro et al., ff. Tr. 831, at 16-17. The DRC interviews covered about 150 disasters, but Dr. Dynes had reviewed about 400 events for his 1970 book Organized Behavior in Disaster. Tr. 919 (Dynes). In a sample of 443 persons who held positions in emergency-related organizations, not one abandoned his emergency role obligations to opt for familial-role obligations. Crocker et al., ff. Tr. 19,431, at 12. Of those who were not at work at the time of the emergency, less than one percent indicated some delay in reporting to work. Id.

(footnote continued)

to lower-level employees. Cordaro et al., ff. Tr. 831, at 15-16:

- Q. If you were interviewing someone about their performance of their job, would you expect someone to tell you, "I did not report to perform my job, but I was supposed to. I was needed there and I didn't." Is that something you would expect?
- A. Oh, you might not expect that, but the question is need — you have other cross-checks on that. In other words, you're interviewing other people in the organization, the observation, if somebody didn't report [sic in transcript].

Tr. 1045 (Dynes). Moreover, the researchers were actually present during some emergencies and could observe how the organizations functioned.

No one has ever denied that people may engage in on-the-job search activity or attempt to contact their families as they do their emergency work. Tr. 1035 (Dynes). And some people who are not on the job may see to their family before they report, or there may be other reasons for delayed reporting. Tr. 1037 (Dynes). In the DRC study, when people temporarily left their jobs, the lapse of time in most instances was very short. Tr. 1038 (Dynes). Generally speaking, these dozen or so people were not needed for the organization to do its work at the time. Tr. 1039-40 (Dynes). The point is that in all cases the organization continued to function, and as a general matter there were too many people, not too few. Tr. 1040-41 (Dynes).

Suffolk County's expert witnesses testified that the DRC data are "not reliable" and "not relevant." Cole et al., ff. Tr. 20,672, at 38. They cite six arguments why, most of all of which the Board has considered before. The fact remains that the DRC data cover a large number of real emergencies in which role abandonment did not prove to be a problem. No amount of fabricating distinctions can alter that. To say these data are "not relevant" is overreaching.

b. FEMA DRQ's

Second, FEMA since November 1986 has collected information about major emergencies on a reporting form called a Disaster Response Questionnaire (DRQ). Crocker et al., ff. Tr. 19,431, at 32-33. Among other things, these DRQ's are used to report problems encountered during emergencies. Id. at 33. In the 300 of these DRQ's compiled since 1986, no mention was made of role abandonment as a problem in real emergencies. Id.; Tr. 19,964-65 (Kelly). The Intervenors would distinguish these data on the ground that they were not about radiological emergencies.

c. LILCO's Phone Surveys

In addition to already-existing sources of data on past emergencies, LILCO undertook to gather information of its own. At LILCO's request, its witness Mr. Kelly reviewed information on 50 U.S. evacuations. In a project for a different client, Mr. Kelly's company had started with a population of approximately 249 emergencies (Tr. 19,839 (Kelly)) and from it selected 50 evacuations, using a rating system that tended to select large, quickly developing, problem-laden evacuations in densely populated areas, particularly near nuclear power plants. Crocker et al., ff. Tr. 19,431 at 26; Tr. 19,836-40 (Kelly). Of these 50 cases, Mr. Kelly identified 16 large-scale evacuations in which buses had been used to evacuate people. Crocker et al., ff. Tr. 19,431, at 27. For these 16, Mr. Kelly reviewed secondary sources such as newspaper clippings, after-action

reports, communications logs, police/emergency services reports, and sociology reports. These sources revealed no evidence that any bus driver had failed to drive. *Id.* at 27 and Attachment E; Tr. 19,842, 19,855 (Kelly).

After this study was completed, Mr. Kelly identified three additional evacuations in which buses had been used, making a total of 19. Crocker *et al.*, ff. Tr. 19,431, at 27; Tr. 19,844 (Kelly). Seventeen of these involved technological hazards and two natural hazards. Crocker *et al.*, ff. Tr. 19,431, at 28. Most of the evacuations involved the use of buses to evacuate non-school populations; four involved the evacuation of two to seven schools. *Id.* at 28. Four or five hundred buses were involved in total. Tr. 19,938 (Kelly).

To gather additional information, Mr. Kelly and people under his supervision phoned "knowledgeable people who had emergency responsibility" at each of the 19 disasters. Crocker *et al.*, ff. Tr. 19,431, at 27. Two separate studies were done. The first surveyed organizational respondents, and the second surveyed bus drivers who had actually responded to the emergencies. For the organizational study, generally one or two "emergency managers" and one or two bus company officials were interviewed for each of the 19 accidents. See *id.*, Att. G. Forty-eight interviews in all were held. See *id.* For the survey of individual bus drivers, 27 drivers participated in 10 of the 19 evacuation cases. *Id.*, Att. I at 1. Mr. Kelly testified that it was difficult to find more bus drivers to interview because of privacy concerns. Tr. 19,936-37 (Kelly).

LILCO summarized its findings as follows:

- There were no refusals to drive the buses by any notified bus drivers.
- All bus drivers reported for duty after being contacted.
...
- In three cases bus drivers were reported to have arrived late for duty. One bus company in the Marysville incident reported that 1 or 2% of the drivers were

delayed due to traffic congestion. In the Pinellas incident about 10 percent of one bus company's drivers (about 20 drivers) showed up late because they first helped "take care of families." In the Miamisburg incident it appears that a few drivers showed up late due to family concerns.

- After receiving the duty call, only 3-5 bus drivers in one event (Miamisburg) helped evacuate their families before showing up for duty, despite the fact that in nine evacuations, 5% to 100% of the drivers had families in the area at risk during the emergency.
- There were no reports of bus drivers not doing their job as well as they could have.
- In seven of the 19 evacuations, bus drivers did not know beforehand that they had an emergency role.
- In all of the evacuations, there were enough drivers to drive evacuation buses. . . .
- In all cases everyone who needed to be evacuated was evacuated.

Crocker et al., ff. Tr. 19,431, at 28-29.

LILCO testified that the data collected from the individual bus drivers were in line with the data collected from organizational response. Id. at 29. No bus drivers refused to drive buses, and only two drivers reported doing something before beginning their bus driver functions. Id. at 29-30. The first of these two reported a few minutes later and the other 20 minutes later. Id. at 30.

One of the County's expert witnesses testified, based on a cursory review of the LILCO data, that the data are "completely irrelevant." Cole et al., ff. Tr. 20,672, at 59. As with the County witnesses' opinion of the DRC data, this opinion overreaches. LILCO made a concerted effort to search for actual role abandonment and failed to find it. Indeed, when two of the phone calls indicated that a few bus drivers had abandoned their roles, Mr. Kelly made follow-up calls to get additional information. Tr. 19,920-21 (Kelly). He found that in fact there were no refusals to drive. Tr. 19,921 (Kelly). This

evidence may be subject to some criticisms, but it is by no stretch of the imagination "completely irrelevant," and no fair-minded witness would say so.

d. Intervenors' Records

Fourth, evidently the Intervenors, like LILCO, could find no evidence that role abandonment has been a problem in past emergencies. Suffolk County made inquiries to each of its school administrator witnesses and found that the school officials have no documentation or additional information about role conflict. Board Memorandum and Order (Ruling on LILCO Motion to Compel Answers to Certain Interrogatories and Requests for Production of Documents), at 2 (Apr. 14, 1988). Likewise, New York State has not been able to locate any instances of bus drivers, in any emergency, attending to the safety of their own families before reporting to perform their bus driving duties. Response of the State of New York to LILCO's Second Set of Requests for Admissions Regarding Role Conflict of School Bus Drivers at 3 (Mar. 4, 1988). See Attachment 4 to these proposed findings.

Moreover, according to the Response of Suffolk County, the State of New York, and the Town of Southampton to LILCO's First Set of Requests for Admissions Regarding the Remand Issue of "Role Conflict" of School Bus Drivers (Feb. 1, 1988), county emergency plans for other nuclear plants in New York State expect bus companies to maintain their normal responsibilities (Westchester and Oswego County plans) and assume that public school bus drivers will respond to perform evacuation assignments (Westchester County plan).^{47/} See Attachment 5 to these proposed findings. Finally,

^{47/} The Board notes that the recently disclosed "County of Suffolk Emergency Operations Plan," which expressly applies to radiological emergencies, including nuclear war, does not appear to be concerned with role conflict. It contains an Annex N with a number of plans and procedures for schools. For example, Annex N, Appendix 2, contains a "School Service" section. (School Service is apparently a service of the County Division of Emergency Preparedness.) One of the "Assumptions" is that

(footnote continued)

it is not disputed that "bus driver training conducted in accordance with plans for nuclear plants in New York State other than Shoreham does not address caring for families of bus drivers in emergencies." Response of the State of New York to LILCO's Second Set of Requests for Admissions Regarding Role Conflict of School Bus Drivers at 2-3 (N. Y. L. R. 4, 1988).

e. Anecdotal Accounts

Fifth, many anecdotal reports suggest that role abandonment has not been a problem in real emergencies. See, e.g., Crocker et al., ff. Tr. 19,431, at 25-26.^{48/}

Conversely, the only recent reports of role abandonment have been anecdotal. Dr. Miletì reported an account of a policeman who, under extreme circumstances, left his job. But this was an extreme situation, and even he attempted to come back to work when his family had been taken care of. Crocker et al., ff. Tr. 19,431, at 38-39. LILCO's witnesses admit that role abandonment can occur, but they say it is very unlikely -- an "outlying" kind of event. Tr. 19,530 (Miletì).

(footnote continued)

B. Schools can provide personnel and facilities useful in mitigating the effects of a disaster to the extent that school disaster plans are coordinated with local and State agency plans.

One of the School Service's "Standard Operating Procedures" is to

3. Cooperate and coordinate with other jurisdictions in the acquisition and use of school personnel, facilities and equipment to mitigate the effects caused by the disaster.

^{48/} See also LILCO Ex. 1 (reception centers proceeding) at 21 (witness who was present during the Ginna accident testifies that "[c]alm prevailed" both onsite and offsite; witness who was at Palomares, Spain clean-up of plutonium spill saw no evidence of either U.S. personnel or Spanish residents fleeing; some 3000 U.S. soldiers and airmen participated).

The only specific case cited by the Intervenors (both in 1984 and in the most recent hearings), was a case of a school bus driver who tended to her own child's injuries after an accident. Tr. 20,420-21 (Smith). In the County witness's opinion, the bus driver was devoting too much attention to her own child and "overlooked" another, more serious injury. Tr. 20,421 (Smith). The school administrators also cited, both in 1984 and 1988, the ordinary type of family-job conflicts that happen all the time and, in 1988, one case involving people asked to volunteer for emergency duty. Tr. 20,406 (Suprina) (people not available during hurricane to assist with transportation to shelter areas or to serve food or to help supervise). Apparently these were school personnel who felt that "If the schools are closed today, I really don't have an obligation to come in there." Tr. 20,406 (Suprina).

f. Radiological Accidents

Sixth, in the testimony that has been presented to us on past radiological emergencies, there is no evidence of role abandonment having ever caused a problem. The radiological emergencies that have been discussed in some detail are Hiroshima, Windscale, Three Mile Island, Ginna, and Chernobyl. Nuclear attack, as at Hiroshima, is a "category apart" as emergencies go, Tr. 19,541 (Mileti), because there the community was physically destroyed, including the disaster response organizations. Even though most of the doctors and nurses were killed or injured, some of them mobilized at a school and attempted to provide medical care until they were simply overwhelmed by the number of casualties. Tr. 19,462-63 (Mileti). No evidence has been presented to show that "role abandonment" to care for one's family was a problem in these disasters.

At Three Mile Island, there was no evacuation of the schools. However, there was an early dismissal following the Governor's advisory. Tr. 19,453-55 (Mileti). Despite the extensive literature on this emergency, no one reported seeing any reference

to any problems at all occurring with the early dismissal of schools.^{49/} Tr. 20,181-82 (Lindell, Mileti).^{50/}

With respect to emergency workers other than bus drivers, Dr. Mileti had phone calls made to a variety of organizations in the TMI area. He found that by and large most people went to work. PID, 21 NRC at 673; Tr. 19,450 (Mileti); see also Cordaro et al., ff. Tr. 831, at 73-76. Moreover, the Kemeny Commission Report devote only a single short passage to the reports that some hospitals were undermanned during the accident. Cordaro et al., ff. Tr. 831, at 72; Crocker et al., ff. Tr. 19,431, at 34-35.^{51/} Dr. Mileti explained, both in 1983 and in the most recent hearings, that there was no medical emergency at TMI and that a variety of other factors helped to explain the small number of doctors at local hospitals. Cordaro et al., ff. Tr. 831, at 78; Crocker et al., ff. Tr. 19,431, at 35, Tr. 19,971, 19,973, 19,981-82 (Mileti).

At Windscale in England in 1957, reportedly large vehicles of some sort were mobilized in case an evacuation were needed. Tr. 19,986-87 (Mileti). Dr. Mileti has been able to find no references to role abandonment except a single passage in a 1975

^{49/} As noted above, one bus company reported that 108 of its 110 drivers had reported for duty during the TMI-2 accident. 14 NRC at 1634.

^{50/} Similarly, in 1983 Professor Erikson testified that teachers in the early stage of the accident at Three Mile Island stayed in the schools with their students and in general did not abandon their posts. Tr. 1347-49 (Erikson). He explained that this was before any kind of advisory about evacuation or other precautionary action. Tr. 1347-48 (Erikson). "[T]he accident was in progress for a long time at TMI before an advisory was broadcast, and it is that interim period of time I was talking about" Tr. 1414 (Erikson). At the time there was "a great circulation of rumors but no advisory to evacuated" Tr. 1414 (Erikson). There is no evidence that teachers abandoned their jobs at any time during the TMI accident.

^{51/} Dr. Dynes, head of the Task Force on Emergency Response and Preparedness for the President's Commission on the Accident at Three Mile Island, Tr. 1474-75 (Dynes), testified that role conflict was not a "major variable" in what happened at TMI; it was a "meaningless concept" as far as the Commission was concerned. Tr. 1162-63 (Dynes).

popular book citing a reporter who had talked to a "scientist" who had packed his family away at the time of an emergency. Crocker et al., ff. Tr. 19,431, at 38. There is no indication that the scientist had an emergency job with respect to the Windscale accident. Tr. 19,988 (Mileti).

The Ginna accident has already been discussed in the Board's PID. PID, LBP-85-12, 21 NRC 644, 673-74 (1985). At Ginna the emergency operations center was activated and offsite radiological monitoring teams reported for duty. PID, 21 NRC at 673-74. All utility workers remained at their jobs, and police and firemen who had offsite emergency jobs responded. Id. at 674. We have seen no evidence to change these 1985 findings about Ginna.^{52/} Indeed, in the reception center hearing last summer a State witness confirmed that emergency workers had performed well at Ginna. Tr. 18,174-75 (Czech).

Finally, at Chernobyl some 1,100 buses from Kiev reportedly were mobilized and used to evacuate people from around the accident. Crocker et al., ff. Tr. 19,431, at 36. There is no evidence that bus drivers abandoned their roles to protect their families or for any other reason. Id. at 36-37. At the time of the evacuation people in Kiev may not have regarded themselves at risk. Tr. 20,190-91 (Mileti). At most, this means only that the experience at Chernobyl is not dispositive of the issue; at least, Chernobyl constitutes one more real (radiological) emergency in which no role conflict problem has been documented.^{53/}

^{52/} See also, in the 1983-84 record, Cordaro et al., ff. Tr. 831, at 93, Att. 8; Tr. 1166-67 (Weismantle, Cordaro); see Tr. 2170-71 (McIntire). See also Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 959 (1983) (the experiences at TMI and Ginna support the orthodox assumptions about human behavior, particularly with respect to the responsiveness of professional emergency workers).

^{53/} The same may be said for accidents or near-accidents like the NRX reactor accident at Chalk River, Canada in 1952; the SL-1 accident in Idaho in 1961; the Fermi Unit 1 accident in Detroit in 1966; the Browns Ferry fire in 1975; and others. See Crocker et al., ff. Tr. 19,431, at 37-38.

We can sum up the historical record as follows. There are at least three ways of looking at the issue of role abandonment. One is organizational: Have organizations ever been unable to perform their tasks because of role abandonment? The answer is that never in the history of the country has an emergency organization not been able to do its job because of role conflict. Tr. 19,540, 19,633 (Mileti). As Dr. Mileti put it:

I am resting that [my opinion] on the basis of my judgment or interpretation or reading of the historical record of emergencies in this nation that we have experienced with and without emergency plans, that there has never in the history of the country been an organization that has been unable to do what it was supposed to do in an emergency because of role abandonment or role conflict or role stress, whatever label we want to use.

Tr. 19,570-71 (Mileti). This testimony is uncontradicted on the record.

A second way of looking at the issue is functional: Did the job get done? No evidence has been presented, either in 1983-84 or in the most recent hearing, that any emergency job ever failed to get done because of role abandonment.^{54/} Indeed, the responses to LILCO's phone survey of organizations showed that in all cases everyone who needed to be evacuated was evacuated. Crocker et al., ff. Tr. 19,431, at 29. There were no reports of bus drivers not doing their job as well as they could have. Id.

A third way of looking at the problem is at the individual level: Have any individuals ever abandoned their roles? Once again, there is virtually no evidence that any individual bus driver, or for that matter any emergency worker, has ever completely abandoned his role because of his family. There are cases of people having delayed (usually for a short time) before reporting to work because of family concerns.

^{54/} Lewis Killian, in his 1952 article, observed that "in none of the four communities studied [one of which was Texas City] did the disastrous consequences contemplated above seem to have materialized." Cordaro et al., ff. Tr. 831, at 54; see also id. at 13 (Killian, while seeming to present cases of potential conflict, pointed out that none of this had any real effect on the operation of the emergency social system).

See, e.g., Tr. 20,185 (Kelly), 20,189-90 (Mileti). There are also cases in pre-1969 research papers reporting that some people abandoned their jobs to protect their families. But the clear weight of the evidence is that individuals do not abandon emergency-relevant jobs in time of emergency.

There is an evacuation about once a week in the United States. Tr. 1962 (Dynes). Newspapers would be likely to report cases of role abandonment if they had occurred. Crocker et al., ff. Tr. 19,431, at 27. Moreover, it is likely that emergency managers would be aware of significant defections by emergency workers. Given all this, it would be astonishing if role conflict had been a problem and yet gone unreported.

Faced with this record, the choice faced by the Board is clear-cut. Do we conclude that Dr. Cole's opinion polls and the predictions of experts on school operation, but not human behavior in emergencies, accurately foretell the future? Or do we rely on the opinions of experts on human behavior (weighed against other such experts with less experience with emergencies) and on the entire historical record from 1776 forward? It is quite clear that if one asks people whether they think people would take care of their families first in a future, hypothetical radiological emergency, many of them will say yes. See, e.g., Harris, ff. Tr. 1218, at 12, 15 (hospital administrators stated their staff would be unlikely to report); Tr. 1250-53 (Harris). It is equally clear that if one asks them what happened in true emergencies in the past, they will report that emergency workers did report for duty. See Tr. 1254-56 (Harris) (policemen, volunteer firemen, and volunteer emergency medical personnel reported after the Grucci fireworks explosion). In light of the fact that Dr. Cole's polls do not predict the future, that the applicant's experts were better qualified, and that there is no historical evidence of any failure of a bus driver or other organization to fail to perform, the Board can only find in LILCO's favor.

F. LILCO's Efforts With Regular Drivers

The Contention here at issue, 25, alleges that the LILCO Plan "fails to address the problem of emergency worker role conflict." 21 NRC at 981. The evidence shows that this is not true.

LILCO has offered training^{55/} to regular bus company personnel, including bus drivers and dispatchers.^{56/} Crocker et al., ff. Tr. 19,431 at 59; Tr. 19,490-93, 19,536-37 (Crocker). Training consists of a seven-hour course in radiation, the Shoreham plant, and personal dosimetry and further training on the individual procedures. Crocker et al., ff. Tr. 19,431 at 59; Tr. 20,095 (Crocker). Also, LILCO has also made available to regular school bus drivers its family tracking system and LERO family reception center. Crocker et al., ff. Tr. 19,431 at 59; Tr. 19,503 (Crocker).^{57/}

G. Number of Bus Drivers Needed

To determine the number of bus drivers needed to evacuate all schools in the Shoreham EPZ, the student populations of each school must be determined. Suffolk

^{55/} Training consists of a seven-hour course in general emergency preparedness, LERO, communications, rad protection, dosimetry, and personnel monitoring, a one-hour class dealing with the LERO school bus driver procedure. In addition, for LERO drivers there is bus driver training and about eight hours of "road rallies," all done annually. Tr. 20,095 (Crocker).

^{56/} See also Cordaro et al., ff. Tr. 9154 (Vol. II of May 30, 1984 transcript) at 60.

^{57/} The Family Tracking System is a formalized means for LERO workers to be in contact with their families. Cordaro et al., ff. Tr. 831, at 22-24; Tr. 894-901, 904 (Weismantle). So far as any of the witnesses know, no other plan has such a feature, Tr. 900 (Weismantle), 2155-56 (McIntire). Their families have a special relocation center. Cordaro et al., ff. Tr. 831, at 21. The plan has always been to advise outside groups, as well as LERO workers, about the tracking system and special relocation center. Tr. 905 (Weismantle).

LILCO emphasizes, however, that the Family Tracking System and special family relocation center are not necessary. LILCO regards them as "extras" designed merely to ease the minds of emergency workers.

County spent a good deal of hearing time cross-examining on the precision of the school population figures used by LILCO as a planning base. See Tr. 19,746-814. The population figures used by LILCO were based on a telephone survey conducted in July 1987 and are set forth on a school-by-school basis in Attachment K to LILCO's written testimony and in LILCO Bus Driver Ex. 1. The total population of the students was 27,099. New York State and Suffolk County figures totaled 26,537, as provided January 19, 1988. See LILCO Bus Driver Ex. 1, 3, and 4. LILCO checked its numbers and the Intervenors' numbers with another telephone survey in April 1988 and came up with 26,453. See Tr. 19,747-49, 20,169 (Crocker). LILCO Bus Driver Ex. 1; Tr. 19,747-51, 20,168-70 (Crocker). According to Mr. Crocker and the information in LILCO School Bus Driver Exhibit 1, there was little variance among the different population numbers for each individual school as provided by the parties. Tr. 20,167-71 (Crocker).^{58/}

In its testimony, Suffolk County did not provide a complete set of population figures, and none of the County witnesses knew the student populations for the school districts they did not represent. Tr. 20,319-20 (Smith, Supina, Petrilak). In any event, the enrollment figures for each schools are likely to go up or down during each year, Tr. 20,297 (Petrilak), and the compiling of yearly figures is a task that LILCO has committed to perform, Crocker et al., ff. Tr. 19,431, at 52; Tr. 19,804, 19,814 (Crocker).^{59/} See also Tr. 19,822 (Crocker) (LILCO is committed to provide sufficient resources).

^{58/} Concerns were raised about whether LILCO's plan provides for Mt. Sinai high school students who attend school in Port Jefferson. Brodsky et al., ff. Tr. 20,259, at 39. LILCO explained that these students would be evacuated with the other students who attend schools in the Port Jefferson school district. Tr. 20,175-76 (Crocker).

^{59/} See also Cordaro et al., ff. Tr. [9154] (Vol. II of May 30, 1984 transcript) at 25 ("the circumstances of the schools change from year to year, with openings and closings of schools, shifts in enrollment, changing transportation requirements . . .").

Once the number of students was known, LILCO determined the number of drivers needed. LILCO reduced the student populations of each school by 5% to account for daily absences and reduced each high school population by 20% to account for students who drive to school or ride to school with another student. Crocker et al., ff. Tr. 19,431, at 50-51. These were the same assumptions litigated during the 1984 emergency planning hearings. Id. at 51. The Board believes that it is reasonable to reduce all student populations by 5% and high school populations by an additional 20% for planning purposes. There is sufficient evidence in the record from both LILCO and Suffolk County to support an average 5% absentee rate at public schools. Crocker et al., ff. Tr. 19,431, at 51; Cordaro et al., ff. Tr. 9154, Vol. II, at 55; Tr. 19,754-56, 19758-60 (Crocker); Tr. 20308-10 (Muto, Suprina, Petrilak). LILCO also provided credible evidence from a school district in the EPZ to support the 20% reduction for high schools. Tr. 19754-57 (Crocker). According to LILCO witness Crocker, the LERO Plan has sufficient flexibility built into it to accommodate any daily deviation in the student population that would create a need for additional drivers. Tr. 19, 59-60 (Crocker). Given these facts, the Board finds this part of LILCO's calculations to be reasonable.

Next, LILCO computed how many drivers would be needed based on the number of students that could be loaded safely on a bus. For this purpose, LILCO used industry standards, that is, 40 students per bus for high school and 60 for lower grades. Crocker et al., ff. Tr. 19,431, at 51. Suffolk County witnesses argued that these figures were too high for long distances and for middle school students. Brodsky et al., ff. Tr. 20,253, at 41-42. The Board acknowledges that some of the buses may be crowded. However, we do not believe that the health and safety of the school children will be endangered. In drawing this conclusion, the Board notes that there is some flexibility in the actual number of students who will be loaded on a bus, since the student populations at each

school are not evenly divisible by 40 or 60 (thus some buses will not be filled to capacity) and since LILCO does not intend to combine student populations from different schools to fill up each bus. Crocker et al., ff. Tr. 19,431, at Att. K.

Also, many of the buses that will be used to evacuate schools have 22 seats; thus they can hold 44 high school or 66 elementary and middle school children. Brodsky et al., ff. Tr. 20,259 at 14, 21; Tr. 20,319 (Petrilak). The Board also believes that it is reasonable to expect that the school districts would use all the buses and drivers available to them. Thus buses and drivers that normally go to schools outside the EPZ could be used for schools inside the EPZ. Drivers of smaller buses and vans, which are not accounted for in LILCO's numbers, also could be used.

Using the above figures and assumptions, LILCO calculated that 509 bus drivers^{60/} are needed to evacuate the entire EPZ in a single wave. Crocker et al., ff. Tr. 19,431, at 50; Tr. 19,743-44 (Crocker). LILCO has determined that the number of the "regular" (i.e., non-LERO) drivers is 301, based on bus counts and information from bus company owners.^{61/} LERO therefore needs to supply an additional 208 drivers to

^{60/} Of this number, 470 bus drivers are needed for public schools, 15 for parochial schools, and 24 for nursery schools. Crocker et al., ff. Tr. 19,431, at 50. Only the bus drivers of public school children are the focus of the "role conflict" issue, since parochial and nursery schools normally do not provide their own transportation and since LILCO plans to provide for all of their transportation needs. Id. at 51-52; LILCO Supplemental Testimony, ff. Tr. 19,431, Att. O at II-20a.

^{61/} In addition, there are a certain number of "extra" drivers employed by or on contract to the school districts, for which LILCO takes no credit. Tr. 20,174 (Crocker). LILCO also takes no credit for those bus drivers employed by or on contract to the school districts who drive smaller sized buses and vans. Id. See Cordaro et al., ff. Tr. 9154 (Vol. II of May 30, 1984 transcript) at 59 (according to one bus company, school districts require at least a 10-15 percent reserve of bus drivers); id. at 61 (one school district's plan provides for teachers or custodians to drive buses if bus drivers cannot be reached); Tr. 9315 (Robinson) (bus companies have extra drivers); 9315-16 (Cordaro) (in some school districts teachers and other school employees are qualified to drive buses). Cf. Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1629 (1981) (many sources of back-up school bus drivers are available on short notice, e.g., teachers).

effect a single-wave evacuation of all EPZ schools. Tr. 19,689 (Crocker).

H. LERO School Bus Driver Procedures

LERO's procedure for school bus drivers is Attachment 14 to OPIP 3.6.5. LILCO's Supplemental Testimony, ff. Tr. 19,431, at Att. P. That procedure provides for two types of LERO school bus drivers: (1) "backup" drivers who would serve as backups to the regular drivers and will drive if one of those drivers decide not to drive, and (2) "primary" drivers who would drive the extra number of buses needed for a single-wave evacuation. Crocker et al., ff. Tr. 19,431, at 49. In the event of a Shoreham emergency that would require the evacuation of EPZ schools, the LERO drivers would be mobilized and would report directly to a pre-designated bus yard. Id. at 53-54; Tr. 20,028-33 (Crocker). Primary drivers will automatically pick up a bus pursuant to contracts between the bus yard and LILCO. Back-up drivers will only drive if asked to by the bus dispatcher. Both backup and primary LERO drivers will drive to the school designated on the assignment packet that they will pick up from the LERO box. Crocker et al., ff. Tr. 19,431, at 54-55. LERO boxes will either be stored at the bus yard or will be brought to the yard by LERO at the time of an emergency. Regular school bus drivers who decided to drive a bus to evacuate schools will also use the assignment packets. Id. at 59. Regular drivers who have not received LERO training will be told what to do by the bus dispatchers and helped by LERO drivers. Id. at 59-60. Assignment packets contain all the necessary information they need to help evacuate a particular school out of the EPZ. See LILCO Supplemental Testimony, ff. Tr. 19,431, Att. P. It also contains KI and dosimetry for their use in protecting their own health. Crocker et al., ff. Tr. 19,431, at 60.

LILCO has committed to provide 100 percent LERO backup for the regular school bus drivers and 150 percent coverage of the additional "primary" LERO drivers

needed to accomplish a "single wave" evacuation. Crocker et al., ff. Tr. 19,431, at 53; Tr. 20,022 (Crocker). At present LILCO expects to have 613 LERO school bus drivers. Crocker et al., ff. Tr. 19,431, at 52. Most of them have already been recruited and trained. Tr. 19,704 (Crocker).

Suffolk County spent a good deal of time at the hearing cross-examining on the details of LILCO's procedure for supplying LERO school bus drivers. The Board allowed the County considerable leeway to do this. However, most of the questioning was outside the scope of the limited remand issue. Moreover, it went to the sort of detail that a Licensing Board is not supposed to consider under the Waterford decision. Louisiana Power & Light Co. (Waterford Stream Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1106-07 (1983). Also, much of this questioning appeared to be in furtherance of a theory that there would be too many, not too few, bus drivers. See, e.g., Tr. 20,040 (Crocker). For example, the County suggested during its cross-examination that the large additional number of bus drivers would be difficult to handle in the limited areas of the bus yards. Tr. 20,041-43 (Crocker).

Suffice it to say that the applicant's witness Mr. Crocker made it clear that all of the hypothetical problems raised by Suffolk County have been considered and addressed in LILCO's planning.^{62/} The possibility that there might be congestion in the bus yards or that it might take several minutes more or less to check out a bus and leave the yard (see Tr. 19,725-27 (Crocker)) is not material. The Board finds, in short, that LILCO's plan provides reasonable assurance that adequate protective actions can and will be taken in a radiological emergency at Shoreham.

^{62/} See also Cordaro et al., ff. Tr. 9154 (Vol. II of May 30, 1984 transcript) at 50 (There is a [LERO] Public School Coordinator and a Private School Coordinator responsible for seeing that each school district is called).

I. Adequacy of the Number of Drivers

Based on his 1988 survey of volunteer firemen, Professor Cole concluded that "less than one third of volunteer firemen can be counted on to help out during an emergency at the Shoreham plant. Cole et al., ff. Tr. 20,672, at 55. He also concluded that because school bus drivers "do not have the experience, training, or commitment of firemen," it is likely that, consistent with the results of the 1982 school bus driver survey, substantially more than 60 percent of the school bus drivers would look first to the needs of their family and that "only a small fraction" could be counted on to report on time. Id. at 57. The 1982 survey of 246 school bus drivers showed that 24 percent said that they would report to work. Id. at 41. Professor Cole also thought that, if anything, the level of role conflict has increased since 1982. Id. at 42.

If we attributed precise numerical predictive validity to Dr. Cole's surveys (and we do not), his results would show that perhaps 20-30 percent of the regular bus drivers would show up for work. This is so even if we assume that "taking care of their family first" meant total abandonment of their roles. Even if we make these bold assumptions (that polls predict the future and that only one role can be performed), there would still be 120 percent coverage of the regular school bus positions. The 50 percent overstaffing of the LERO principal driver positions and the additional drivers^{63/} that the school bus companies have available provide additional assurance.

^{63/} For example, in the Riverhead Central School District the Transportation Supervisor has a list of drivers' names with their telephone numbers, including alternate numbers if necessary. Tr. 20,341 (Doherty). The District has a call system with a few drivers acting as "captains." Tr. 20,342 (Doherty). The Transportation Supervisor's office staff attempt to contact drivers that the call system has not been able to reach. Id. There is also a list of substitute drivers, and the Supervisor has on occasion gone to the homes of drivers or to restaurants they frequent. Tr. 20,342-43 (Doherty). The Supervisor testified that this system provides "pretty good coverage." Tr. 20,344 (Doherty).

The Intervenors have attempted to make much of some school districts' unwillingness at present to cooperate with LILCO. LILCO admits, for example, that two bus companies and one school district that owns buses "will not talk to" LILCO. Tr. 20,050-51 (Crocker). But this does not alter the Board's finding that LILCO's planning is adequate. LILCO has incorporated various measures to compensate for the possible unpreparedness of regular school bus drivers. For example, LILCO's public and private schools coordinators call each school district in an emergency. Crocker *et al.*, ff. Tr. 19,431, at 56-57; Tr. 19,729 (Crocker). Written instructions will be available at the time of an emergency. Crocker *et al.*, ff. Tr. 19,431, at 54-55. Each LERO bus driver will be able to explain the evacuation procedures to school personnel. *Id.* at 57. LERO auxiliary bus drivers will help regular drivers understand what to do and may in some cases accompany the regular drivers. *Id.* at 60.^{64/}

The Intervenors' case with respect to the LERO drivers rests in the final analysis on two propositions, one legal and one political. The legal argument is that LILCO's emergency bus drivers do not meet all of the legal requirements for regular school bus drivers. The political argument is that the school administrators would decline to use LERO's buses and drivers.

LILCO's answer to the legal argument is as follows. Suffolk County's school administrator witnesses testified that their regular bus drivers must be certified in accordance with State law provisions to be morally and physically qualified, as well as competent to transport school children. Brodsky *et al.*, ff. Tr. 20,259, at 50.^{65/} This

^{64/} Also, it is not likely that the school districts would choose to remain in a state of ignorance after the Shoreham plant had a full-power license. See Tr. 20,388-93 (Rossi, Doherty, Smith, Suprina, Petrilak).

^{65/} Suffolk County school administrator witnesses also testified that a "1987 Nassau County law" makes it illegal for an unlicensed Suffolk County bus to enter Nassau Coun-

apparently refers to "Regulation 19-A," which specifies driver qualifications. Tr. 20,361 (Smith, Doherty, Rossi). However, Article 19-A, entitled "Special Requirements for Bus Drivers," does not apply to temporary, emergency bus drivers such as LILCO proposes to provide. As used in Article 19-A, the term "bus driver" expressly does not include persons "who, as a volunteer, drive a bus with passengers for less than thirty days each year;" N.Y. Vehicle and Traffic Law § 509-a(2) (McKinney's 1986) (Attachment 6 to these proposed findings). Also, the Governor and local county executives have the authority to override particular laws if they interfere with an emergency response. N.Y. Exec. Law, Article 2-B, §§ 24.1.f, 29-a (McKinney 1982). Finally, there is evidence that legal restrictions do not apply, or are ignored, for other nuclear plants in New York State. Crocker et al., ff. Tr. 19,431, at 58; Tr. 20,142-43 (Crocker).

In short, it is simply not plausible that the existence of legal restrictions on regular school bus drivers would be allowed to interfere with saving school children in a radiological emergency. To the extent that the alleged legal restrictions appear to be based on health and safety considerations, LILCO has successfully demonstrated that the concerns underlying them would be taken care of in an emergency. For example, the concern about supervision of the school children would be handled under the LILCO Plan by having school administrators or teachers accompany the children. See Crocker et al., ff. Tr. 19,431, at 58.

(footnote continued)

ty. Brodsky et al., ff. Tr. 20,259, at 55. First, this testimony is not sufficient evidentiary foundation for a finding based on the cited law. Second, the existence of such a law is irrelevant to the issue of the number and availability of bus drivers. Third, it is simply not credible that public officials would allow such a law to prevent the evacuation of school children in an emergency. Fourth, if such a law were to be mindlessly enforced in an emergency, presumably it would mean either that someone would have to pay a fine or that the buses would have to stop at the county line until other transportation could be arranged. In either case, radiological health and safety would not be jeopardized.

Similarly, the Board accepts LILCO's answers to the political objection raised by the Intervenor. The political objection, as we note above, is that the school administrators will not allow school children to ride with a LERO bus driver. This issue is not within the scope of the remanded issue. See Tr. 20,107 (Judge Gleason). The Applicant is not required to guarantee that its resources will be used.

The Board is confident that the school administrators, including those who testified in this hearing, would do the best they could in an emergency to provide for the school children. If there was sufficient time (despite the fact that an evacuation had been recommended), the schools could use their own limited number of bus drivers in multiple waves if they chose. (It is anomalous, however, that the County's witnesses are concerned about the willingness of drivers to drive and yet propose to have a few of them drive into the EPZ time and time again.) If speed were of the essence, we believe that they would use LERO drivers, accompanied by teachers or administrators, in the interest of taking the children to safety as fast as possible. See Tr. 19,709, 19,710 (Crocker). Indeed, the NRC's new emergency planning rule, which presumes that governments would follow a utility plan unless they have something better, applies to school districts if their governing bodies are popularly elected or appointed, directly or indirectly, by popularly elected officials. This is the case on Long Island. Tr. 20,260-61 (Petrilak, Muto, Suprina).

The Intervenor's argument boils down to the proposition that victims of an emergency must consent in advance to be saved according to the plan.^{66/} Nothing in the

^{66/} See Cordaro *et al.*, ff. Tr. 9154 (Vol. II of May 30, 1984 transcript) at 31 (LILCO does not regard schools as "support organizations" for which written agreements are required); *id.* at 32 (schools have their own agreements with bus companies; LILCO's understanding is that NRC regulations do not require agreements with individual bus drivers).

NRC regulations imposes or even suggests such a requirement.^{67/} LILCO has committed to provide drivers sufficient to evacuate all school children in a single wave. LILCO's plan for making these buses and drivers available is acceptable. Nothing more is required.

J. Board Decision on School Bus Driver Role Conflict

In weighing all the evidence, the Board finds that LILCO has met its burden of proof. The evidence on both sides can be summarized thus:

Weighing the Evidence

	<u>For LILCO</u>	<u>For the Intervenors</u>
Empirical Data	Historical record	Opinion polls
Theory	Theory of emergency consensus and "role certainty"	Theory of roles and love of family
Literature	Post-1969 literature	Pre-1969 literature
Opinion	Opinions of Drs. Lindell and Miletic, Turner, Barton, and Cole	Opinions of school officials and Drs.
Back-up	LERO drivers to replace postulated missing regular bus drivers	Argument that they would not be used

The Board finds, again, that opinion polls lack predictive validity and that the historical record shows little or no evidence of role conflict ever having been a significant problem in any emergency, radiological or nonradiological. On this ground LILCO has by far the better case.

^{67/} The Board has already found that LILCO need not obtain written agreements with schools. PID, 21 NRC at 858. And it has found that there is no requirement for written agreements with parents for transportation of their children. Id.

As for theory and literature, LILCO's theory is based on more recent literature by researchers with experience in actual emergencies and, more important, is supported by the historical record. On this ground, too, LILCO has the better case.

As for expert opinions, the County's school administrators are not experts at all in human behavior. The County's sociologists are less qualified to address emergency behavior than LILCO's witnesses. Again, LILCO has the better case.

Finally, the Intervenors simply have no answer to LILCO's commitment to fill in for the regular bus drivers in case some of them are missing, except an answer that is outside the scope of the remanded issue and in fact outside the requirements of the NRC.

In short, the Board finds for LILCO. As we found generally in 1985 (PID, 21 NRC at 679), the Board now finds that, with respect to school bus drivers, role conflict will not be a significant problem at Shoreham and that a sufficient number of school bus drivers will respond in a timely fashion to perform their assigned duties.

Indeed, in light of the overwhelming empirical evidence that role abandonment has not been a problem in past emergencies, that bus drivers in particular have been willing to drive in past emergencies, and that school bus companies on Long Island have substitute drivers they can call on other than LERO's back-up drivers, the Board finds that it is not necessary, and not required by the NRC regulations, for LILCO to provide the "back-up" drivers (as distinguished from the "primary" LERO drivers that are needed to accomplish a single-wave evacuation of the schools).

III. Hospital Evacuation Time Estimates

A. History of the Issue

1. Licensing Board's Partial Initial Decision

Previously, the LILCO Plan provided for sheltering in the hospitals as the

preferred protective action measure for patients, and provided for evacuation of hospital patients only on an ad hoc basis. In our Partial Initial Decision on Emergency Planning ("PID"), we agreed with LILCO that, since the three hospitals in question were near the EPZ boundary and provide good sheltering protection, sheltering would be preferred in most cases. Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-85-12, 21 NRC 644, 840-46 (1985). Accordingly, we did not require exact estimates of the time needed to evacuate these hospitals. Id. at 846.

2. Appeal Board Ruling

The Appeal Board, however, remanded the hospital evacuation issue to this Board citing the regulations regarding emergency planning, and specifically requiring LILCO to provide specific evacuation time estimates for the three hospitals near the EPZ boundary. Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), ALAB-832, 23 NRC 135, 156-57 (1986). It held that "the Licensing Board should have required the applicant to fulfill the same planning obligations with regard to possible hospital evacuations as the Board imposed in connection with the nursing/adult homes." Id.

3. Commission Review

The Commission reviewed the question of whether the "NRC's regulations in 10 C.F.R. § 50.47(c)(1) require evacuation plans for hospitals in the EPZ even though sheltering would be the preferred option in most circumstances." Commission Order (Sept. 19, 1986) at 2. The Commission agreed with the Appeal Board that "the regulations require the applicant to fulfill the same planning obligations with regard to hospital evacuation as the Licensing Board imposed in connection with other like segments of the EPZ, such as nursing/adult homes." Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), CLI-87-12, 26 NRC 383, 385 (Nov. 5, 1987). The Commission further noted that:

Under 10 C.F.R. § 50.47(c)(1), the Licensing Board could still approve the LILCO Plan if it is found that the deficiencies related to hospitals were not significant for Shoreham. In fact, the Licensing Board did identify factors that may have relevance to this question, such as distance from the plant and construction characteristics of the hospitals. However, it is not clear to us that this was a matter adequately presented to or considered by the Licensing Board, since the Licensing Board did not specifically discuss 10 C.F.R. § 50.47(c)(1). On remand, LILCO and Staff are free to raise the issue for appropriate resolution.

CLI-87-12, 26 NRC at 385.

4. LILCO's Motion for Summary Disposition

On December 18, 1987, LILCO moved for summary disposition of the hospital evacuation issue on the ground that no genuine triable issue of material fact existed, and that LILCO was entitled to judgment as a matter of law. LILCO based its Motion on the Commission's invitation to this Board to consider LILCO's existing hospital plans under 10 C.F.R. § 50.47(c)(1), without further hearings, and to find them adequate if any deficiencies are "not significant." *Id.* In the alternative, LILCO argued that the existing record considered along with the additional details regarding hospital ETES which were contained in Revision 9 to the LILCO Plan satisfied Appeal Board and Commission concerns about its evacuation plans for hospitals. In response to LILCO's motion, the Intervenors asserted twenty allegedly disputed facts.^{68/}

^{68/} Statement of Material Facts as to Which There Exists a Genuine Issue to be Heard on Matters Raised by LILCO's Motion for Summary Disposition of the Hospital Evacuation Issue, attached to Government's Response to LILCO's Motion for Summary Disposition of the Hospital Evacuation Issue, dated January 15, 1988. In our Order, we stated that "[m]any of these 'facts' are not facts but are questions whose resolutions are of the nature of ultimate findings." Memorandum and Order (Ruling on LILCO's Motion for Summary Disposition of the Hospital Evacuation Issue) (Feb. 24, 1988), ASLBP No. 86-529-02-OLR, 27 NRC ____, slip op. at 9. We address those questions in this partial initial decision.

With regard to "matters of identifying the reception hospitals and their resources," we ruled that "[d]etermining whether these hospitals and their resources exist are matters we believe to be clearly ministerial matters properly left to the Staff." Memorandum and Order at 10. Furthermore, we stated that LILCO's reliance upon the figure of 14% availability for space in the receiving hospitals "provides a reasonable planning basis for [determining] the number of beds which would be free at some indeterminate time in the speculative future during the occurrence of an unlikely event." *Id.* at 11. We reaffirmed this decision in our April 14, 1988 Memorandum and Order (Ruling on Intervenors' Motion for Reconsideration of Board Order on Summary Disposition of Hospital Evacuation Issue), ASLBP No. 86-529-02-OLR, 27 NRC ____, slip op. at 3.

Thus, the Board decided that "only the narrow issue of the accuracy of the evacuation time estimates seems to us both unresolved and important. . . . We therefore will hold a hearing on the matter, restricting it to the narrow confines of the bases and accuracy of the evacuation time estimates presented in Revision 9." *Id.* at 12.^{69/}

Three days of hearings were held on this issue. On May 27, 1988, the NRC Staff presented its witness Thomas Urbanik, II. LILCO presented the testimony of its witnesses Diane P. Dreikorn and Edward B. Lieberman on June 2, 1988. On June 3, the State of New York presented the testimony of its witness David T. Hartgen. Suffolk County and FEMA presented no witnesses on the issue of the bases and accuracy of LILCO's hospital ETES.

B. LILCO's Position

There are three hospitals at issue in this proceeding. Two (John T. Mather Memorial and St. Charles Hospitals) are located just inside the 10-mile boundary, and the

^{69/} Revision 10 was issued on May 16, 1988; the hospital ETES are the same as those contained in Rev. 9.

third (Central Suffolk Hospital) is just outside the 10-mile emergency planning zone (EPZ). 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 (April 13, 1988), ff. Tr. 20,586 at 3 [hereinafter LILCO Testimony].

After the Appeal Board's remand of the hospital evacuation issue, LILCO retained KLD Associates to develop evacuation time estimates (ETEs) for these hospitals. *Id.* at 5. These estimates serve as a basis for a reasoned protective action recommendation regarding whether to shelter or evacuate at the time of an emergency. *Id.* at 4; Tr. 20,652-655 (Kline, Dreikorn); Tr. 20,801 (Shon).

The general methodology used to calculate evacuation time estimates consisted of a dynamic, event-based, simulation of vehicle movements from within the EPZ to reception points. Rebuttal Testimony of Edward B. Lieberman and Diane P. Dreikorn on the Remanded Issue of the Bases and Accuracy of LILCO's Hospital Evacuation Time Estimates (May 18, 1988), ff. Tr. 20,586 at 18 [hereinafter LILCO Rebuttal]. The implementation procedure calls for the homebound disabled to be evacuated first, followed by those who are in special facilities located closest to the nuclear power station, and then those progressively more distant facilities from the power station within the EPZ. LILCO Testimony, ff. Tr. 20,586, Att. C at IV-178. Since the three hospitals are located on the periphery of the EPZ and sheltering would likely be the protective action of choice in the majority of cases, they are evacuated last. *See* LBP-85-12, 21 NRC at 846. Thus, the hospitals are generally evacuated by vehicles during the second and third waves. The procedures used to calculate the ETEs are straightforward but highly detailed. They involve the following steps:

(1) Updating Information, as necessary:

- Number, type, and locations of all special facilities and hospitals;

- Number, type, and locations of all host facilities; and
 - Number, type, and schedules of availability of all emergency vehicles.
- (2) Stating Postulates:
- Estimates of travel speeds, stratified;
 - Estimates of times for driver processing, passenger loading and unloading, and monitoring; and
 - Establishing sequence of evacuation activities.
- (3) Developing Data Base:
- Estimating travel distances and delineating routes.
- (4) Performing Calculations:
- Selecting the sequence of facilities to be evacuated;
 - Defining the "platoon" of vehicles for each run;
 - Delineating the path of travel for each run and for each "platoon" of vehicles;
 - Calculating the travel time 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; and
 - Establishing the identities of all vehicles which perform multiple runs.

(5) Summarizing Results:

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

LILCO Testimony, ff. Tr. 20,586 at 5-8.

In developing the assumptions and calculating the hospital ETES, KLD followed the guidance of 10 C.F.R. Part 50, Appendix E and NUREG-0654, Appendix 4 and Rev. 1, Supp. 1. *Id.* at 8. The methodology employed for calculating the hospital ETES is the same ~~is~~ that used for special facility ETES and found to be appropriate. LBP-85-12, 21 NRC at 835-38. Additionally, the dynamic analysis method used was directly responsive to NUREG-0654, Rev. 1, Supp. 1. LILCO Testimony, ff. 20,586 at 10.

A variety of estimates and assumptions were used in the course of these calculations, and are stated in Revision 9 of Appendix A to the LILCO Plan. *Id.* at 8-9. Most of these assumptions were litigated previously, including the availability of adequate ambulances and ambulettes, capacity of vehicles, loading and unloading times, travel speeds, and priority of evacuation. LBP-85-12, 21 NRC at 835-46. See also LILCO's Testimony on Contentions 72.A and E, ff. Tr. 9101. Certain of these previously litigated assumptions were clarified in LILCO's Testimony:

- ° In calculating the hospital ETES, the arrival of vehicles at evacuating facilities was scheduled to avoid or minimize queuing. LILCO Testimony, ff. 20,586 at 9.

- ° As vehicles became available for reassignment, they generally were allocated to the evacuating hospitals in proportion to the number of patients remaining. Id.
- ° Ambulances needed for multiple trips generally received assignments to reception hospitals that were closer to the EPZ than the reception hospitals to which ambulettes and buses were assigned. Id. at 10.

These assumptions and estimates, including the clarifications of the previously litigated assumptions, were not refuted by the Intervenors. Other assumptions included the rate at which vehicle resources become available at the Brentwood and Peconic dispatch centers, the amount of time required to brief drivers and provide them dosimetry, and the time allocated to monitoring occupants of vehicles. Id. at 11-12. These assumptions also were not refuted.

The results of the ETE analyses are contained in Revision 9 of the LILCO Plan. Id. at Att. C at IV-181 through IV-185. The LILCO Plan contains ETEs for normal weather conditions and for inclement weather conditions (rain and snow). Specifically, for a full 10-mile evacuation in normal weather, the evacuation time estimate for John T. Mather Hospital is 12:00 hours; for Central Suffolk Hospital, 12:19 hours; and for St. Charles Hospital, 12:20 hours. Longer ETEs were determined for the inclement weather conditions.

Subsequent to the manual calculations of these hospital ETEs, whose results are displayed in Revision 9 and Revision 10 of the Plan, KLD developed a computerized spreadsheet model of the computational procedures. LILCO Rebuttal ff. Tr. 20,586 at 2, 5-9. This model was developed as a result of the State's professed concerns about the absence of sensitivity analyses on LILCO's ETEs. Id. at 2, 9-13; Tr. 20,590 (Lieberman). The results of this modeling were included in rebuttal testimony filed on May 18.^{70/}

^{70/} Corrections to this testimony were submitted on May 31, 1988 to correct several minor errors in the KLD computer model. The corrections did not cause material changes in the ETEs.

The sensitivity analyses performed using the KLD model confirmed and verified the results obtained from the manual calculations and demonstrated the relative insensitivity of the ETEs to reasonable changes in travel speeds. LILCO Rebuttal, ff. Tr. 20,586, at 8-18; Tr. 20,645 (Lieberman). The sensitivity analyses further demonstrated that two factors play a dominant role in determining the ETE: the policy of evacuating facilities closer to Shoreham first, and the schedule of availability of vehicles at the dispatch center. Tr. 20,656 (Lieberman).

C. Intervenors' Position

New York State's witness, Dr. David Hartgen, reviewed LILCO's hospital ETEs to assess the bases and accuracy of the methodology and the results. Direct Testimony of David T. Hartgen, Ph.D., P.E., on Behalf of the State of New York Regarding Hospital Evacuation Time Estimates (April 13, 1988), ff. Tr. 20,692 at 7 [hereinafter Hartgen Testimony]. The scope of Dr. Hartgen's review involved relevant portions of the LILCO Plan, the worksheets prepared by KLD in calculating the hospital ETEs, and the input and output tables for the KLD computer model. Id. at 3-6, Hartgen Surrebuttal, ff. Tr. 20,692 at 3. Although he testified that he is familiar with the use of sophisticated computerized transportation models and has experience with transportation planning, including traffic time estimates and methods for computing them, Hartgen Testimony, ff. 20,692 at 1-3, Dr. Hartgen testified that he has neither calculated, reviewed, or critiqued ETEs for any other nuclear power plant than Shoreham. Id. at 20,699-700, 20,788 (Hartgen).

Dr. Hartgen argued that many of the underlying assumptions and estimates incorporated in KLD's analysis render the hospital ETEs unreliable. Hartgen Testimony, ff. Tr. 20,692 at 7-35. Furthermore, Dr. Hartgen maintained that errors in KLD's spreadsheet model raise further questions about the accuracy and reliability of the

sensitivity analyses. Surrebuttal Testimony of David T. Hartgen, Ph.D., P.E., on Behalf of the State of New York Regarding Hospital Evacuation Time Estimates (May 26, 1988), ff. Tr. 20,692, at 4-9, 18-19 [hereinafter Hartgen Surrebuttal]; Tr. 20,694, 20,697 (Hartgen).

Other issues raised by Dr. Hartgen included (1) perceived inaccuracies in the estimated distances used to represent routes from facilities inside the EPZ to reception facilities outside the EPZ, Hartgen Testimony, ff. Tr. 20,692 at 28-30, (2) LILCO's assignment of patients from evacuating hospitals to reception hospitals, *id.* at 19-25; Tr. 20,701-704 (Hartgen), and (3) that there is little excess room available at the reception hospitals so that any decrease in available space will greatly increase ETEs. Hartgen Testimony, ff. Tr. 20,692 at 24-25.

The State believes that to the extent that the assumptions used in the KLD analysis are inaccurate or fail, the evacuation time estimates can change accordingly. Hartgen Testimony, ff. Tr. 20,692 at 7-9; Tr. 20,710-711 (Hartgen). Dr. Hartgen testified that on the basis of his sensitivity runs the ETE could be up to 66% longer than estimated by LILCO. Hartgen Testimony, ff. Tr. 20,692 at 12-18. He also argued that the actual circumstances during an emergency could differ in detail from the assumptions represented in the KLD model. *Id.* at 8-9, 18, 21-23, 29-30, 33; Hartgen Rebuttal, ff. Tr. 20,692 at 16-17; Tr. 20,704-706 (Hartgen). Dr. Hartgen indicated that evacuation time estimates are useful to personnel who are implementing the evacuation only if those assumptions are true at the time of the accident. *Id.* He argued that it is questionable whether LILCO personnel could successfully develop a complex vehicle and reception hospital assignment scheme based on the scheme developed by KLD, and that the hospital evacuation time estimates upon which a protective action recommendation would be based could be lengthened. *Id.*

Dr. Hartgen assessed the sensitivity of the ETE with respect to some of the assumptions specified in Appendix A of the LILCO Plan, Rev. 9. Hartgen Testimony, ff. Tr. 20,692 at 17-18, 34. These assumptions specify the average speeds of travel over various roadways, both within the EPZ and outside the EPZ, and for various time periods ranging from before the end of evacuation to periods after the evacuation of the general public is completed. In his assessment, Dr. Hartgen used "traces" of the last vehicles which evacuated St. Charles Hospital. *Id.* at 17. Variations on the speed estimates used by KLD were introduced into the trajectories of these trace vehicles to calculate a different ETE. *Id.*

Dr. Hartgen introduced an article by Mr. Lieberman which, he claimed, demonstrated that the speeds used by KLD were too optimistic, and indeed "arbitrary." *Id.* at 12-18. The results of Dr. Hartgen's sensitivity tests indicated that the ETE could vary by as much as -27% to +66% of the estimates provided by KLD. *Id.* at 17-18, 34. This led Dr. Hartgen to conclude that knowledge of the actual speeds at the time of an accident would be useful, Tr. 20,706-712 (Hartgen).

D. NRC Case

The NRC Staff's witness, Dr. Urbanik, testified that the hospital ETEs calculated using the KLD analysis were more comprehensive and extensive than those he had reviewed for any other nuclear power plant in the United States. Tr. 20,516, 20,523 (Urbanik). He testified that the ETEs were accurate, Tr. 20,530-531 (Urbanik), and responsive to the guidelines set forth in NUREG-0654. Tr. 20,491-495, 20,515 (Urbanik), Testimony of Dr. Thomas Urbanik, II (April 13, 1988), ff. Tr. 20,460, at 6 [hereinafter Urbanik Testimony].

Dr. Urbanik also testified that planning studies, such as the calculations of ETEs, always involve assumptions regarding future events, and that there are uncertainties in

virtually every number that goes into the calculation. Urbanik Testimony, ff. Tr. 20,460 at 5-6, Tr. 20,482-491 (Urbanik). The mere presence of uncertainties does not make the estimates unreliable. Reliability of the results of such studies depends upon the reasonableness of these estimates and assumptions, Tr. 20,482-491 (Urbanik), and Dr. Urbanik testified that the estimates and assumptions used by KLD were reasonable. Urbanik Testimony, ff. Tr. 20,460 at 4. Specifically, with regard to travel speeds, Dr. Urbanik stated that even under severe congested conditions, the average speed along a limited access highway would not fall below 20 mph -- a figure which is slightly higher than the 15 mph figure used by KLD. Tr. 20,486-488 (Urbanik). In Dr. Urbanik's opinion the KLD speed estimates were conservative, and if anything were low. Tr. 20,515 (Urbanik).

Dr. Urbanik testified that the results from the KLD computer model confirmed, and were confirmed by, the results of the manual calculations set forth in the Plan. Tr. 20,473 (Urbanik). Furthermore, the computer model is particularly useful for conducting sensitivity analyses and generating revised ETEs for future updates to LILCO's emergency plan. Tr. 20,503, 20,528 (Urbanik). Dr. Urbanik also pointed out that, for what he perceived to be reasonable assumptions and reasonable variations of assumptions, all of the computed ETEs before the Board produced similar results. Tr. 20,471, 20,508-511, 20,530-51 (Urbanik).

E. Board Decision on Hospital ETEs

We have given the positions of the parties and the portions of the record which support them careful consideration. The narrow issue on remand for decision by this Board is, as we defined it in our Memorandum and Order ruling on LILCO's motion for summary disposition, "the accuracy and bases of the [hospital] evacuation time estimates presented in Revision 9 to LILCO's Plan."

Revision 9 of the LILCO Plan sets forth hospital evacuation time estimates for the three hospitals located at the edge of the 10-mile emergency planning zone.^{71/} Included in Appendix A to the Plan are numerous assumptions postulated by LILCO in calculating these ETES. It is primarily those assumptions that we seek to evaluate, because they form the bases of LILCO's ETES.

At the outset, we note that guidance for determining ETES is set forth in 10 C.F.R. § 50.47 and NUREG-0654. Intervenors contend that LILCO's ETES fail in many respects to conform to this guidance. As we noted in our first partial initial decision, LILCO's primary protective action recommendation for hospitals within the EPZ to shelter is consistent with these requirements. We still find that to be so. Upon order of the Appeal Board and Commission, LILCO is required to have ETES for the hospitals and those ETES also must conform to this guidance. As we describe in more detail now, LILCO's hospital ETES conform to both 10 C.F.R. § 50.47 and NUREG-0654.

The Applicant's witness, Mr. Lieberman, argued that the assumptions and estimates used by LILCO were realistic and reasonable. As he correctly points out, many of the assumptions are the same as those used in calculating ETES for special facilities which we approved in our earlier PID. LBP-85-12, 21 NRC at 835-46. Other assumptions are slight modifications or new estimates necessitated by the special circumstances surrounding the hospitals.

The State's witness, Dr. David Hartgen, argued that LILCO's travel speeds are unreasonably high, and therefore, the ETES actually should be much longer than those in LILCO's Plan. We find his concerns to be lacking in factual basis. For example, LILCO's estimated speed of 15 mph along the westbound LIE during the evacuation,

^{71/} As noted previously, Revision 10, issued on May 16, 1988, makes no change to the hospital ETES contained in Revision 9.

which was applied in the KLD analysis, was slightly lower than the 18 mph which the Board already accepted as reasonable in our PID on reception centers. Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-88-13, 27 NRC ___ (1988), slip op. at 45-48. Other assumed speeds are comparable to those found acceptable by the Board in the earlier decision. LBP-85-12, 21 NRC at 805-09. Therefore, the Board finds that these estimates of speeds are reasonable and rejects the lower speeds assumed by the State in its testimony. Specifically, Dr. Hartgen criticized KLD's speed of 15 mph for congested controlled access roads during the evacuation, and cited a speed of 8 mph by reference to a paper co-authored by Mr. Lieberman. This value does not represent an average value over the entire length of the highway but applies to only one small intersection (or ramp) considered in that paper. Furthermore, the NRC Staff's witness, Dr. Urbanik, testified that an average speed of 20 mph is reasonable for these conditions. All parties agree that speeds vary over time and location. The Board agrees that LILCO's use of reasonable average speeds is appropriate.

The LILCO Plan specifies the reception hospitals which are assumed to be available in the event patients in the three hospitals are evacuated. These hospitals are at least 5 miles from the EPZ boundary and capable of treating contaminated, injured individuals. These criteria comply with guidance set forth in the regulations noted above. Furthermore, we reject New York State's criticisms regarding the availability of sufficient space for evacuating patients, as an improper attempt to relitigate our ruling on LILCO's motion for summary disposition and our ruling on the Government's motion for reconsideration of that Order. Matters regarding the existence and sufficiency of resources and facilities for an evacuation of the EPZ hospitals is a matter appropriate for oversight by the Staff.

LILCO's general plan to first use those reception hospitals closest to the EPZ and then those farther away, is a reasonable means of reducing overall evacuation times. Further, given the high degree of sheltering provided at the evacuating hospitals and the desirability of evacuating persons nearest the Shoreham facility first, it is reasonable to evacuate the hospitals last.

Other New York State criticisms of LILCO's ETE calculation process, including the selection of evacuation routes, are without support and hence rejected.

New York State's primary concern regarding LILCO's hospital ETEs was the lack of sensitivity analyses. Dr. Hartgen developed a simple model following the two "trace" vehicles in order to perform several sensitivity runs. He concluded that the ETEs are particularly susceptible to changes in speeds, with as much as a 66% increase for one set of assumptions. LILCO responded to the criticism regarding sensitivity analyses in its Rebuttal Testimony and subsequent Corrections. The Board finds the assumptions used by Dr. Hartgen to obtain a 66% increase in ETE to be unreasonable. Specifically, his assignment of a speed of 6 mph for the LIE over a 20-hour period is contrary to common sense and the testimony and experience of Dr. Urbanik and Mr. Lieberman. Furthermore, the Board agrees with Mr. Lieberman that Dr. Hartgen's sensitivity run does not fairly portray reality since Dr. Hartgen retains an extremely low travel speed long after the evacuation of the entire EPZ has been completed.

Comparing the credible sensitivity analyses of both Dr. Hartgen and Mr. Lieberman, the Board finds the experts in essential agreement. Mr. Lieberman has developed a sophisticated computer model which describes the dynamic process encompassing the entire evacuation of special facilities, including the hospitals. Using that computer model, Mr. Lieberman performed a variety of sensitivity runs, including several of those described by Dr. Hartgen. The ETEs are relatively insensitive to

reasonable variations and uncertainties in speeds. On this basis, the ETes computed by LILCO are reasonable and in compliance with NUREC-0654.

Dr. Hartgen also argued that errors in the KLD computer model render the results questionable or inaccurate. We dismiss this argument, noting the reasonableness of the input assumptions, and the relative agreement of results among the three methods presented to the Board (LILCO's manual and computer analyses, and Dr. Hartgen's spreadsheet analysis).

Finally, Dr. Hartgen argued that the KLD model has little or no utility in an actual emergency, that more sensitivity runs are necessary to assess its validity, and that greater planning effort at this stage is necessary to build flexibility into the evacuation strategy. The model, of course, as explained by LILCO's witnesses, is not designed to be used during an emergency evacuation; rather, it is a tool used in advance of the order to evacuate to predict likely evacuation times so that decisionmakers can make more informed decisions in an emergency, such as whether to shelter or evacuate hospital patients. Tr. 20,607 (Lieberman). Indeed, Dr. Hartgen was at a loss to explain how data on variations in average speeds at the time of an accident could even be collected, as a practical matter. Tr. 20,706-708, 20,711-713 (Hartgen). Further, it seems to us that more than sufficient analysis and attention has been devoted to assessing the reliability of LILCO's ETes. We find LILCO's evacuation strategy to be reasonable and workable. Furthermore, we are satisfied with the bases and accuracy of LILCO's hospital ETes. The intervenors have failed to show any lack of compliance with regulatory standards. Accordingly, we hereby approve LILCO's ETes for hospitals.

IV. Board Conclusions

The foregoing sets forth the Board's findings of fact. Based on these findings, and upon consideration of the entire evidentiary record in this proceeding, the Board

makes the following conclusions of law: the Applicant's planning basis for school bus drivers and its plan for providing additional bus drivers and its evacuation time estimates for hospitals are adequate and satisfy the NRC's regulatory standards and criteria of 10 C.F.R. § 50.47(b) and NUREG-0654.

Order

On the basis of the foregoing findings of fact, conclusions of law and opinion, and the entire record, it is this ___ day of _____, 1988

ORDERED:

1. The issues remanded by the Appeal Board in ALAB-832 and CLI-87-12 of school bus driver role conflict and hospital evacuation time estimates are resolved in favor of the Applicant as described in this Decision.

2. In accordance with 10 C.F.R. §§ 2.760, 2.762, 2.764, 2.785, and 2.786, as amended, this Partial Initial Decision shall become effective immediately and will constitute, with respect to the matters resolved herein, the final decision of the Commission thirty (30) days after issuance hereof, subject to any review pursuant to the above-cited Rules of Practice. Any party may take an appeal from this Partial Initial Decision by filing a Notice of Appeal within ten (10) days after service of this Decision. Each appellant must file a brief supporting its position on appeal within thirty (30) days after filing its Notice of Appeal (forty (40) days if the Staff is the appellant). Within thirty (30) days after the period has expired for the filing and service of the briefs of all appellants (forty (40) days in the case of the Staff), a party who is not an appellant may file a brief in support of, or in opposition to, any such appeal(s).

THE ATOMIC SAFETY AND
LICENSING BOARD

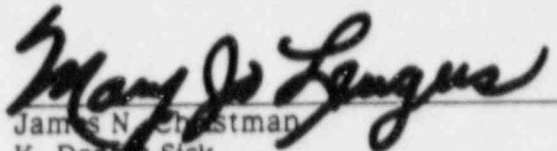
James P. Gleason, Chairman
ADMINISTRATIVE JUDGE

Dr. Jerry R. Kline
ADMINISTRATIVE JUDGE

Frederick J. Shon
ADMINISTRATIVE JUDGE

Date: ... Bethesda, Maryland
this ___th day of _____, 1988.

Respectfully submitted,



James N. Christman
K. Dennis Sisk
Mary Jo Leugers
Rita A. Sheffey
Counsel for Long Island Lighting Company

Hunton & Williams
707 East Main Street
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DATED: June 22, 1988

- Attachment 1 -- List of Witnesses
2 -- Exhibits by Party and Number
3 -- Testimony of Richard Feldkamp, Zimmer proceeding

- 4 -- Response of the State of New York to LILCO's Second Set of Requests for Admissions Regarding Role Conflict of School Bus Drivers (Mar. 4, 1988)
- 5 -- Response of Suffolk County, the State of New York, and the Town of Southampton to LILCO's First Set of Requests for Admissions Regarding the Remand Issue of "Role Conflict" of School Bus Drivers (Feb. 1, 1988)
- 6 -- "Definitions" from New York Vehicle and Traffic Law, Article 19-A

LIST OF WITNESSES

LILCO

LILCO presented the following witnesses:

Witness	Position	Tr. Location ^{1/}
Douglas M. Crocker	Manager, Nuclear Emergency Preparedness, Nuclear Operations Support Department, Long Island Lighting Company, Central Islip, New York	19431
Diane P. Dreikron	Supervisor, Offsite Plans and Facilities, Long Island Lighting Company, Central Islip, New York	20586
Robert B. Kelly	Senior Project Manager, Roy F. Weston, Inc., Washington, D.C.	19431
Edward B. Lieberman	Vice President, KLD Associations, Inc., Huntington Station, New York	20586
Michael K. Lindell	Associate Professor, Department of Psychology, Michigan State University, East Lansing, Michigan	19431
Dennis S. Mileti	Professor, Department of Sociology, and Director, Hazards Assessment Laboratory, Colorado State University, Fort Collins, Colorado,	19431

^{1/} Resumes or professional qualifications of all witnesses in this proceeding are bound in with their testimony. The transcript pages listed in this column indicate the location of their admitted testimony.

LIST OF WITNESSES

SUFFOLK COUNTY WITNESSES

Suffolk County presented the following witnesses:

<u>Witness</u>	<u>Position</u>	<u>Tr. Location</u>
Allen H. Barton	Professor of Sociology, Columbia University, New York, New York	20672
Bruce G. Brodsky	Optometrist; Trustee, Middle County Central School District	20259
Stephen Cole	Professor of Sociology, State University of New York at Stony Brook; President, Social Data Analysts, Inc.	20672
Edward J. Doherty	Supervisor of Transportation, Riverhead Central School District	20259
Howard M. Koenig	Superintendent of Schools, East Meadow Union Free School District	20259
Nick F. Muto	Superintendent of Schools, Longwood Central School District	20259
Robert W. Petrilak	Owner, ACM Data Systems, Mt. Sinai; Trustee, Mt. Sinai School Board	20259
Anthony R. Rossi	Transportation Supervisor, Middle County School District	20259
J. Thomas Smith	Transportation Coordinator, Longwood Central School District	20259
Richard N. Suprina	Superintendent of Schools, Riverhead Central School District	20259
Ralph H. Turner	Professor of Sociology, University of California, Los Angeles, California	20672

LIST OF WITNESSES

NEW YORK STATE

New York State presented the following witness:

<u>Witness</u>	<u>Position</u>	<u>Tr. Location</u>
David T. Hartgen	Director of Statistics and Analysis, New York State Department of Transportation, Albany, New York	20692

NRC STAFF

NRC presented the following witness:

<u>Witness</u>	<u>Position</u>	<u>Tr. Location</u>
Thomas Urbanik, II	Associate Research Engineer, Texas Transportation In- stitute, Texas A&M University System, College Station, Texas	20460

EXHIBITS BY PARTY AND NUMBERSchool Bus Driver Exhibits

<u>Exhibit Number</u>	<u>Description</u>	<u>Identified at Transcript Page</u>	<u>Disposition at Transcript Page^{1/}</u>
<u>LILCO Bus Driver Exhibits</u>			
LILCO Exh. 1	Chart of Various EPZ Public School Population Figures	20168	20172
LILCO Exh. 2	Excerpt from Deposition of Howard M. Koenig, dated February 16, 1988	20263	(not admitted)
LILCO Exh. 3	Response of the State of New York to LILCO's First Set of Interrogatories and Requests for Production of Documents Regarding Role Conflict of School Bus Drivers (January 19, 1988)	20300	20307
LILCO Exh. 4	Response of the State of New York to LILCO's Third Set of Interrogatories and Requests for Production of Documents Regarding Role Conflict of School Bus Drivers (February 10, 1988)	20300	20307

^{1/}Unless otherwise indicated, the exhibit is admitted in.o evidence on the transcript page cited.

<u>Exhibit Number</u>	<u>Description</u>	<u>Identified at Transcript Page</u>	<u>Disposition at Transcript Page</u>
Suffolk County Bus Driver Exhibits			
S.C. Exh. 1	"Role Conflict and Abandonment in Emergency Workers," by Dennis S. Mileti, Emergency Management Review, 1985, Vol. 2, No. 1.	19629	19637
S.C. Exh. 2	Excerpts from OPIP 3.6.5 (Rev. 9)	19768	20157
S.C. Exh. 3	Letter to Michael S. Miller, Esq. from Mary J. Leugers (5/6/88), enclosures OPIP 3.6.5, Att. 3a and Att. 11 (Rev. 10)	19773	19829
S.C. Exh. 4	Suffolk County's Fifth Supplemental Response to LILCO's First Set of Interrogatories and Request for Production of Documents Regarding Role Conflict of School Bus Drivers (April 12, 1988)	19807	19828
S.C. Exh. 5-A	Memo to All District Office Managers from S. J. Maslak (10/8/87), re Appeal for Additional LERO Participants	19817	19829
S.C. Exh. 5-B	Memorandum from W. F. Wilm (10/19/87), re LERO Recruits	19817	19829
S.C. Exh. 6	Organizational Respondent Survey Data Form, Marysville Flood (A. Colbert)	19871	19876
S.C. Exh. 7	Organizational Respondent Survey Data Form, Taft, Louisiana (P. Emig)	19874	19876

<u>Exhibit</u>	<u>Description</u>	<u>Identified at Transcript Page</u>	<u>Disposition at Transcript Page</u>
S.C. Exh. 8	Organizational Respondent Survey Data Form, Hurricane Elena (D. Bilodeau)	19879	19926
S.C. Exh. 9	Organizational Respondent Survey Data Form, Hurricane Elena (L. Newman)	19883	19926
S.C. Exh. 10	Organizational Respondent Survey Data Form, Hurricane Elena (J. Gray)	19891	19926
S.C. Exh. 11	Individual Bus Driver Survey Data Form, Marysville Levee Break and Flood (J. Pratt)	19943	19962
S.C. Exh. 12	Individual Bus Driver Survey Data Form, Marysville Levee Break and Flood (R. Laird)	19943	19962
S.C. Exh. 13	Organizational Respondent Survey Data Form, Marysville Flood (P. Gasdner)	20011	20058

Hospital ETE's Exhibits

<u>Exhibit</u>	<u>Description</u>	<u>Identified at Transcript Page</u>	<u>Disposition at Transcript Page</u>
<u>LILCO ETE Exhibits</u>			
LILCO Exh. 1	KLD Computer Model Output Table 5A	20651	20651
LILCO Exh. 2	KLD Computer Model Output Table 12	20775	20776
LILCO Exh. 3	KLD Computer Model Origin Destination Input Table	20776	20777
LILCO Exh. 4	Reception Hospital Assign- ment Worksheet	20781	20782
<u>New York State ETE Exhibits</u>			
N.Y. Exh. 1	LILCO Plan, Rev. 9, Appen- dix A, pp. IV-172 through IV-187.	20479	20520
N.Y. Exh. 2	NUREG-0654, Appendix 4		20520
N.Y. Exh. 3	NUREG-0654, II.J (Protective Response), pp. 59-65	20498	20520

13-12

1 A Yes.

2 Q Were you aware that other members of the Monroe
3 Township life squad attended that class?

4 A That's when I found out that it was held.

5 Q So there was training that was provided that you
6 did not attend; is that correct?

7 A That's correct.

8 Q And your knowledge of this training is through other
9 members of your life squad who attended this training course; is
10 that correct?

11 A Yes.

12 MR. CASSIDY: Thank you. No further questions.

13 JUDGE FRYE: Redirect?

14 MR. DENNISON: No, your Honor.

15 JUDGE FRYE: Ms. McIntosh, we thank you very much
16 for coming down today.

17 (Witness excused.)

18 MR. DENNISON: Your Honor, the next witness will be
19 Richard Feldkamp.

20 Whereupon,

21 RICHARD FELDKAMP

22 was called as a witness by and on behalf of Intervenor SAC
23 and, having been first duly sworn, was examined and testified
24 as follows:

25

XXXX 1 DIRECT EXAMINATION

2 BY MR. DENNISON:

3 Q Mr. Feldkamp, would you state your name and address
4 for the record, please?5 A Richard Feldkamp, 861 Washington Street, New
6 Richmond, Ohio.

7 Q And would you spell your last name for the reporter?

8 A F-e-l-d-k-a-m-p.

9 Q Mr. Feldkamp, I will hand you a paper that is
10 captioned "Direct Testimony of Richard Feldkamp," which
11 purports to bear your signature, executed under oath on the
12 6th day of January 1982, and I will ask you to review that
13 and advise me if that is in fact your direct written testimony?

14 A (Witness reading document.)

15 Yes, it is.

16 Q Thank you.

17 MR. DENNISON: At this time, your Honor, I would
18 ask that the direct testimony of Richard Feldkamp be placed
19 in the record at this point as his direct testimony.

20 JUDGE PRYE: Objections?

21 Without objection, it will be admitted.

22 (The testimony of Richard Feldkamp follows.)
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

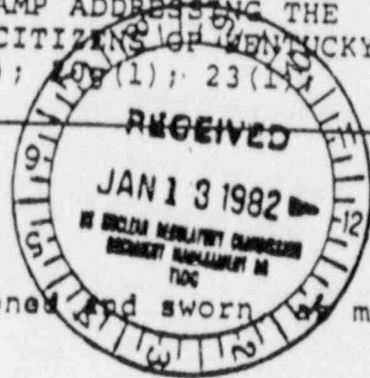
CINCINNATI GAS & ELECTRIC
COMPANY, et al.
(William H. Zimmer Nuclear
Power Station)

DOCKET NO. 50-358

APPLICATION FOR AN OPERATING LICENSE

DIRECT TESTIMONY OF RICHARD FELDKAMP ADDRESSING THE
ZIMMER AREA CITIZENS-ZIMMER AREA CITIZENS OF NEW RICHMOND, OHIO
CONTENTIONS 20c(3), (5); 20e(3), (4); 20g(1); 23(1), (2), (3), (4), (5), (6), (7).

State of Ohio)
) SS:
County of Clermont)



Richard Feldkamp, being first cautioned and sworn of my
testimony state as follows.

I am the assistant chief of the Village of New Richmond life
squad, and in that capacity I am responsible for the operation of
the life squad for the Village of New Richmond, Ohio. I have been
a member of the New Richmond life squad since March, 1980. I am a
member of the Village of New Richmond fire department, as a
firefighter, and have been since 1971. Before March, 1980 I
had served as a member of the Village of New Richmond life squad
for the period of 1967 to 1975. My home address is 861 Washington
Street, New Richmond, Ohio.

I hold a certificate as an emergency medical technician in
my life squad participation and as a firefighter I am the instructor
in fire service. The Village of New Richmond life squad has 16
members and the fire department has 30 members; however, 4 members,

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of which I am one, are both members of the life squad and fire department, in which there are actually 38 members on both fire and life squad rather than ⁴²~~46~~. I have undergone and received radiological training.

The life squad and fire department of the Village of New Richmond are totally comprised of volunteer personnel. Of the fire and life squad personnel, 3 life squadsmen have received radiological training and approximately 6 to 9 firemen have received radiological training to date. I have been advised that the role of the life squad in the event of a Zimmer Station emergency will be to provide emergency assistance to individuals injured and thereafter to be involved in monitoring. The function of firemen in the event of a Zimmer Station emergency will be to provide fire service, if needed, and to engage in monitoring and door-to-door verification of the population located in the Village of New Richmond and in Ohio, Pierce and Monroe Townships.

During the course of the working day, from approximately 8:00 A.M. to 5:00 P.M., there is a low availability of life squad and fire personnel because of employment circumstances. Conversely, during the evening and night hours there is a higher availability of such volunteer personnel. During the course of my involvement as both a life squadsman and fireman in association with the members of the life squad and firemen of the Village of New Richmond, approximately 95% of the life squadsmen have indicated and will not respond in a volunteer emergency response role in the

event of a Zimmer Station accident. As to firemen, approximately 25% will not respond in an emergency role. As for myself, I have a grandmother, mother and my family located within the plume exposure pathway of the Emergency Planning Zone for the Zimmer Station and I must fulfill my obligation to my family and conduct an evacuation of my grandmother, mother and family and, after having evacuated them, I will then determine whether or not to return to the area to undertake an emergency response role.

I have been a resident of the Village of New Richmond for 35 years and, based upon my knowledge and experience of the population residing in the Village of New Richmond and Ohio and Monroe Townships, these individuals will not follow direction presented to them prior to a Zimmer Station accident and they will not follow direction during a Zimmer Station accident. One of the emergency response roles assigned to firemen is to verify the notification of the public, in which that public will be directed to place a green card or, in the absence of that green card, a towel at their front door or mail box. Based upon my experience of this community, approximately half of the population will place such verification notice.

The community living within the plume exposure planning pathway of the Zimmer Station has been exposed to a great deal of publicity concerning the construction of this plant and, most recently, publication of construction defects and other matters which they believe indicates faulty construction of this plant.

In the event of any kind of an accident at the Zimmer Station, the community will overreact and probably panic, there will be numerous vehicular accidents and insufficient manner or means to cope with such situations, and an inadequate number of emergency response personnel, including police, to control such a situation and to provide for the safety of the public. During the course of such events, automobiles will travel U.S. 52 and S.R. 132 as if they are raceways.

Because of the inability of the community to follow directions, their anxieties and related reactions, and the insufficient number of emergency response personnel, the failure to post notification verification card or towel, the control of the public during an evacuation, whether declared or not, is totally unrealistic and can not be implemented for the safety of the community at the time of a Zimmer accident.

I, with my other volunteer response personnel, participated in the November 18, 1981 drill exercise. In approximately September, while in attendance at an emergency preparedness meeting held at the Bethel fire house, I and another volunteer were approached by Ed Canfield and Steve Woolen (phonetic sp.), engineers employed by the Stone & Webster Engineering firm. At that time I and the volunteer with me were requested to take the day off from our employment on November 18, 1981 to participate in the drill exercise and we were promised to be reimbursed by the sum of \$50 for our lost wages. I was further requested to also have available members of the life squad and my companion was requested to have

available firemen, all of whom would be reimbursed by the sum of \$50. It was concluded that I would have available three extra life squadsmen, to be paid, as an extra crew of life squad personnel on November 18 because the crew on duty that day had previously indicated that they would not participate in either a Zimmer drill or a Zimmer accident. I further understood that such arrangements and promises were also made to members of other fire and life squads. On November 17, 1981, at approximately 11:00 P.M., I received a telephone call and was advised that the life squad extra crew would not be needed for the drill exercise, that such advice had been given by Ed Canfield and Steve Woolen of Stone & Webster, and that the extra crew would not be paid. Five firemen were to be paid to be available and that they would be the only ones receiving pay. I remained from my employment on November 18 to participate in the drill and I did participate in the drill as a firefighter.

Prior to November 18, I and other volunteer response support group personnel had been advised and were prepared and available to participate in the November 18 drill exercise. This drill exercise does not present any means of evaluation of the competency of that drill in the face of the response group personnel being totally prepared to engage in the drill on November 18, that large portions of the emergency response group personnel remained from their employment, as did I, to be available and present to commence participation in the drill upon notification that it was commencing. I further find that, in addition to the foregoing, there can not be any competent evaluation of a drill to determine

the ability to implement current emergency plans unless there is participation by all segments of the community in that drill, including the erection of access control devices, notification to the public and responsive verification, and an involvement of the public in evacuation. In the event of an accident at the Zimmer Station, and considering the community, the emergency response personnel who would be available and would perform, the reactions of the public and the emergency response personnel, all result in the inability to implement an emergency plan to in any manner protect the health and safety of the public.

Richard Feldkamp
Richard Feldkamp

Sworn to and subscribed in my presence this 6th day of January, 1982.

Maxine S. Loux

MAXINE S. LOUX
Notary Public, State of Ohio
My Commission Expires Jan. 29, 1985

1 JUDGE FRYE: Mr. Wetterhahn or Mr. Conner?

2 CROSS EXAMINATION

3 BY MR. WETTERHAHN:

4 Q The first minor point. On top of page 2, we
5 discussed at your deposition the addition of 38 members a...
6 16 members in the life squad and the fire department having
7 30 members, with four members being a member of each, and you
8 have a number 46 on the third line of page 2. Should that
9 number be 42?

10 A That's right. Yes, sir. That's -- when I recounted
11 it, I believe that's the way that it -- there was a slight
12 mathematical error there.

13 MR. DENNISON: That is correct, your Honor, and if
14 I might, we could have Mr. Feldkamp correct that on the original
15 at a convenient time in this proceeding. It is a typographical
16 mathematical error on the numbers.

17 JUDGE FRYE: Why don't we correct it now?

18 MR. WETTERHAHN: Are there any other changes, Mr.
19 Dennison?

20 MR. DENNISON: I don't believe so.

21 For the record, so that we all know what is occurring,
22 your Honor, he has --

23 MR. WETTERHAHN: He changed the number 46 in the
24 third line of the second page to 42.

25 MR. DENNISON: May I explain? The circumstances in

1 the second line, it states 38 members and it should state 42.
2 To compound the problem, Mr. Feldkamp inadvertently changed
3 the next number down in the third line. We just corrected
4 46 to the 42.

5 JUDGE FRYE: Why don't we just ask him? Show him
6 the testimony.

7 Mr. Feldkamp, I see the second line on the top of
8 page 2 says "in which there are actually 38 members." Is
9 that 38 correct?

10 THE WITNESS: Yes, it is.

11 JUDGE FRYE: And then it goes on in the next line
12 and says, rather than 46, and that, I take it, should be
13 changed?

14 THE WITNESS: Right. To 42.

15 JUDGE FRYE: It should be 42.

16 MR. DENNISON: That has been what has been corrected,
17 your Honor.

18 JUDGE FRYE: Fine. Mr. Wetterhahn.

19 BY MR. WETTERHAIN:

20 Q Mr. Feldkamp, you have received some training
21 with regard to your response role at the Zimmer station
22 should there be a radiological incident?

23 A Yes, sir, it is.

24 Q By way of clarification, you wear two hats, do you
25 not?

1 A Yes, sir.

2 Q One is a fireman. I will call it an ordinary
3 fireman, and the other one is the head of the life squad; is
4 that not correct?

5 A That's true.

6 JUDGE FRYE: Excuse me. Mr. Feldkamp, would you
7 mind taking the microphone out and holding it? We'll be able
8 to hear you a little better.

9 THE WITNESS: Okay.

10 MR. WETTERHAHN: Was the Board able to hear the
11 previous responses?

12 BY MR. WETTERHAHN:

13 Q By way of background, you wear two hats in New
14 Richmond; one as a fireman, one of the rank and file firemen,
15 if I can call it that; and then as assistant chief, and that
16 title of assistant chief puts you at the head of the life
17 squad in New Richmond. Is that not correct?

18 A Yes, sir, that's true.

19 Q Have you received radiological training with
20 regard to your response role at the Zimmer station?

21 A Yes, sir, I have.

22 Q Have you received it as a fireman or as the life
23 squadsman, or both?

24 A Both organizations were trained together.

25 Q How many -- is that a Plektron or is that a Minotar?

1 A That's my work calling me.

2 Q Okay. I would note for the record there was a
3 beeping sound in the general direction of Mr. Feldkamp.

4 (Laughter.)

5 JUDGE FRYE: I'm sure the Applicant has arranged
6 that so we can see how well these communication systems work.

7 MR. WETTERHAHN: Certainly. We will take credit.

8 (Laughter.)

9 BY MR. WETTERHAHN:

10 Q How many people were trained at that time?

11 A The exact number I can't give you. I know that
12 there was probably -- there was probably 12 people altogether
13 that finished it. Of this, there were three that were life
14 squad people, and then there was -- the rest of them are
15 firefighters, strictly firefighters. And when I say three as
16 life squad people, I'm including myself, who is also a fire-
17 fighter.

18 Q Did your course of study relate to monitoring of
19 yourselves and your surrounding areas, should you be in or near
20 a plume as a result of an incident at Zimmer?

21 A Yes, sir, it did include that.

22 Q Did it discuss what the limits were with regard to
23 the radiation dose you could get as part of your duties as a
24 life squadsman or a fireman?

25 A Yes, it did.

1 Q And this training also encompassed decontamination
2 efforts, first for your own equipment and yourselves, should
3 that be necessary, did it not?

4 A It did.

5 Q That training encompassed such subjects to enable
6 you to assist at evacuation and decontamination centers also;
7 is that not correct?

8 A It did, yes, sir.

9 Q Let me briefly describe, since I believe it's a
10 contention, as to what would occur at one of these relocation
11 decontamination centers, as you studied it in your course of
12 study. If my characterization is incorrect, please let me know.

13 MR. DENNISON: Your Honor, I'm objecting simply from
14 the standpoint that is beyond the scope of direct. I do realize
15 that it is a pertinent and relevant area of inquiry.

16 JUDGE FRYE: I didn't hear that.

17 MR. DENNISON: I do, however, recognize that it is a
18 pertinent and relevant area of inquiry. It's just simply that
19 the Applicant has from time to time reminded me of the certain
20 bounds. I thought perhaps it was time to remind him.

21 MR. WETTERHAHN: I think the case is different here.
22 I have this morning and this afternoon heard the fact that no
23 matter what the label on the contention was, we had to address
24 somehow the substance of the testimony. I don't know what
25 the bounds of this testimony is, really. It certainly goes to

1 his training and what he would do with regard to radiological
2 emergencies. I am really hamstrung. I cannot rely on the
3 title to indicate which contentions it covers, and I really have
4 to rely upon the scope.

5 JUDGE FRYE: The title in this case seems to be
6 very specific.

7 MR. DENNISON: Of course, your Honor, if the
8 Applicant wishes to abide, my position has always been that
9 it ought to be robust, free and open, and if he wants the
10 latitude to both sides, that's fine with me.

11 MR. WETTERHAHN: No, I certainly don't want to go
12 beyond the scope of the direct testimony, and if I did, I'm
13 sorry.

14 BY MR. WETTERHAHN:

15 Q Just for clarification, do you intend the title of
16 this testimony to be part of your testimony?

17 MR. DENNISON: Your Honor, I'm going to object.
18 The document speaks for itself. There is a caption above it.
19 This witness' affidavit portion does not commence until below
20 it.

21 JUDGE FRYE: I think that's quite obvious.

22 BY MR. WETTERHAHN:

23 Q Have you read the contentions enumerated in the
24 title to your testimony which is not part of your testimony?

25 A Are you asking me if I have read my testimony?

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Q No, not the testimony, the contentions as admitted
by this Atomic Safety & Licensing Board. I believe the date is
on December 11, 1981.

A I don't believe I have.

nd 13

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1 Q You state: A large percentage of firemen and/or
2 lifesquad members possibly will not respond to an emergency
3 at the Zimmer Station. Is that not correct?

4 A When I was speaking of that, I was talking mostly
5 of lifesquad people. Most of my lifesquad people have said
6 that they could not or would not respond.

7 Q To Zimmer?

8 A That is in connection with a nuclear disaster at
9 the Zimmer plant. That is not in connection with any kind of
10 a medical emergency other than a nuclear disaster.

11 Q Are you saying that these people would perform
12 their function at all points within the plume EPZ, except
13 they wouldn't respond to a request for assistance at the
14 Zimmer Station? Is that your testimony?

15 (Pause.)

16 A You mean, if they would stand a chance of being
17 contaminated?

18 Q I am distinguishing between a call for a lifesquad
19 in an area within the designated area you would be primarily
20 responsible for in the plume EPZ after an incident at
21 Zimmer. Are you saying that these individuals would not
22 respond to such a call?

23 A I don't know. The thing they told me they would
24 not respond to is Zimmer. So I don't know what their
25 feeling would be in the surrounding area, because I really

1 pressed for them getting all of the radiological training
2 that they could get.

3 Q These individuals for the most part are not the
4 ones on the lifesquad who have obtained this radiological
5 training. Isn't that correct?

6 A That's correct.

7 Q Do you as Assistant Chief intend to offer that
8 training to these individuals?

9 A It was offered to them before at the same time I
10 took my training.

11 Q And they decided not to accept it?

12 A Well, there were several people. The majority of
13 the people did not take it.

14 Q Do you know whether they will be given another
15 opportunity to take such courses?

16 A I have heard of no other classes being offered.

17 Q Would you, yourself, because of your training
18 respond to an emergency? Would you perform your duties, as
19 you understand it, after a radiological incident at Zimmer
20 Station? You, personally?

21 A As long as I was able to monitor myself and the
22 surroundings, I would perform the duties as well as I was
23 able to.

24 Q Have you been provided, or do you know whether you
25 will be provided, with such equipment to monitor yourself

1 and your squad?

2 A We have been provided with that equipment.

3 Q What type of equipment? Can you general describe
4 it?

5 A We were given two -- we were given dosimeters,
6 pocket dosimeters, and we were given two different types of
7 like geiger counters.

8 Q And do you know how to use them?

9 A Yes, sir.

10 Q Have these -- Let's talk about firemen for a
11 second. I'm sure when these individuals respond to a fire
12 there is an increased risk to them as soon as they -- even
13 leaving the fire station, is there not -- because of their
14 going to a fire?

15 A There's always a certain amount of risk; yes, sir.

16 Q There is a certain esprit d'corps among these
17 volunteers since they are not paid on both the firemen side
18 and the lifesquad size? Is that not correct?

19 A I don't know if I completely understood the
20 question.

21 Q Are you proud of your lifesquad?

22 A Yes, sir, we are, very.

23 Q Do you think you have the best one in the county?

24 A Yes, sir, we do.

25 Q No question about that?

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1 A That's right.

2 Q In your role as fireman, have you ever entered a
3 burning building?

4 A Yes, sir, I have.

5 Q In order to rescue individuals?

6 A If there was any to rescue, yes, sir, I have.

7 Q You have searched the premises of a burning
8 building not knowing whether there were individuals inside?

9 A If we were told there was a possibility of someone
10 being in there, yes, sir, we have, sir.

11 Q That's an immediate risk to your health and safety,
12 is it not?

13 A Well, let's put it this way: Somewhat. If you
14 die, you're going to die in there. It's not going to be
15 something that's going to hit you pretty quick without even
16 knowing it.

17 Q But there is some risk you are going to die?

18 A Yes, sir, there is.

19 Q And it's not a small risk. Firemen have died, even
20 in Clermont County, as a result of their duties. That's an
21 unfortunate fact, isn't it?

22 A Yes, sir; that's right.

23 Q But still people are volunteer firemen. Isn't that
24 correct?

25 A That's right.

- 1 Q With regard to low availability of lifesquad
2 personnel, that is a day-to-day fact; is that not correct?
- 3 A In the daytime hours.
- 4 Q That's a problem you faced before Zimmer, and it's
5 a problem you'll probably face after Zimmer. Zimmer doesn't
6 relate to that? Isn't that right? Isn't it just because of
7 employment?
- 8 A Manpower shortage due to unemployment; that's right.
- 9 Q It's really not related to Zimmer?
- 10 A No, sir, it's not.
- 11 Q With regard to page 3 of your testimony, you talk
12 about people not following directions. Is that not correct?
- 13 A That's very true.
- 14 Q One of your jobs is to notify -- is to run the
15 roads, if I can use that term loosely, to verify that people
16 have evacuated? Is that not correct?
- 17 A That's true.
- 18 Q You are very familiar with the roads in your
19 jurisdiction and outside of it?
- 20 A That's right, sir.
- 21 Q Have you yet divided up the roads so that you
22 know which particular vehicle is going to cover which road?
23 Have you gotten that far?
- 24 A We have it broken down into three different
25 divisions, or sectors.

1 Q Now if some percentage of the people along these
2 roads fail to follow instructions -- that is, put the green
3 card in the window -- are you familiar with the green card?

4 A Yes, sir.

5 Q Or tie towels on the mailbox -- that's going to
6 slow your verification, isn't it?

7 A Very much so.

8 Q In your opinion as a resident in the area, if
9 people are informed to do this by the document Circle of
10 Safety, a certain percentage will do that? Is that not
11 correct?

12 A I would have to say that some would, yes.

13 Q If some more of them hear about it over an EBS
14 station -- do you know what that is? An Emergency Broadcast
15 Station over the radio or TV?

16 A Yes, sir.

17 Q You would think that some, after hearing instructions
18 to do so, would do that, too?

19 A Let's hope so.

20 Q If, furthermore, people knew about instructions to
21 the same effect in their phone book, hopefully still a
22 greater percentage of the population will also use that
23 signaling? Is that not correct?

24 A I would sure hope so.

25 Q But if you don't see that signal, you're going to

1 go up to that residence and you're going to check that out?
2 Is that not correct?

3 A That's correct.

4 Q Have you studied systematically any major emergencies
5 requiring evacuation in the past of large sections of a
6 particular jurisdiction?

7 A You're talking in connection with a nuclear
8 emergency?

9 Q No, non-nuclear. Are you familiar, for example,
10 with a large evacuation which occurred in Canada last year
11 or the year before?

12 A No, sir. I didn't follow that.

13 Q So your conclusion on page 4 that automobiles
14 will travel U.S. 52 and 132 as if it were a raceway is not
15 based upon prior emergency situations and the reaction of
16 people in those situations?

17 A It is within our village, yes, sir.

18 Q In an evacuation you would think there are a large
19 number of cars on the road, would you not?

20 A Right.

21 Q It would really be pretty difficult to drag down
22 U.S. 52? Is that not correct?

23 A I'd be willing to say you'd even have cars going on
24 the westbound lane, or the eastbound lane on 52. You'd have
25 four lanes going west.

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Q That would empty out the town pretty fast, wouldn't it?

A Provided they all made it out; right. If you've got five or six cars piled up in an intersection, it's kind of hard to get through.

Q Do you know the function of law enforcement officials during an emergency?

A I believe I've followed that pretty closely.

Q As part of their function, their function would be to control traffic, would it not?

A Yes, sir.

(Pause.)

1 Q As a result of the November 18 exercise were you
2 called upon either as a fireman or as a life squadsman to
3 respond?

4 A That particular day I responded in the capacity of
5 a firefighter.

6 Q Did the firefighters -- did someone critique the
7 response? Did someone evaluate the response of the firefighters?

8 A I believe there was a gentleman there from one of
9 the organizations that was watching us.

10 Q Was there a self-evaluation by any member of your
11 volunteer fire department?

12 A We had a short meeting afterwards just among the
13 people that participated and we discussed our performance and
14 the way we more or less did an evaluation on ourselves.

15 Q Were you entirely satisfied with your performance?

16 A Not at all.

17 Q You weren't even satisfied even though you knew
18 about the exercise in advance, is that right?

19 A For my part I wasn't, that's right.

20 Q You recognized that one purpose of the exercise is
21 to give you an opportunity to correct any deficiencies that
22 you find. Is that not right?

23 A Yes, sir, that's right.

24 Q Have you begun to correct deficiencies that you
25 yourself and other firemen found as a result of your self-

1 evaluation?

2 A Well, the one big one would be the fact that I know
3 now that they have the water supply within the building there
4 and that I don't have to drag hose from the fire truck all the
5 way to the fire site.

6 Q So it was a good idea to have an exercise?

7 A On that portion I would say we should have had a
8 little more training prior to that.

9 MR. WETTERHAHN: May I have thirty seconds?

10 JUDGE FRYE: Yes.

11 (Pause.)

12 BY MR. WETTERHAHN: (resuming)

13 Q Are you familiar, as part of your performance of
14 your duty, either fireman or life squadsman, familiar with
15 floods in the area?

16 A Yes, sir, I am.

17 Q And there are people on -- well, there are people
18 near the Ohio River that are potentially exposed to flood
19 levels?

20 A Yes, sir, there is.

21 Q There is usually sufficient advance warning to
22 evacuate those people, is there not?

23 A In most cases.

24 Q For large floods, many if not all of the people leave,
25 is that not correct?

1 A Yes, sir, that's correct.

2 Q For the other ones that say do you know for a fact
3 whether either you or other firemen, life squadsmen, or police-
4 men have indicated that they would be in some danger themselves?

5 A Yes, sir, we have.

6 Q Is there any way under Ohio law or any other law
7 that you know of that you can physically remove people who are
8 not going to evacuate in the case of a flood in their homes?

9 A I have no idea. We have never done that before.

10 Q You have never physically removed anybody?

11 A No, sir.

12 Q For those people who have stayed, have you ever
13 participated in a rescue operation?

14 A Yes, sir, I have.

15 Q And you were able to perform your rescue duties even
16 though the area was flooded, is that correct?

17 A Yes, sir.

18 Q At some risk to yourself, I would imagine.

19 A I would imagine.

20 Q Based upon your training, can you venture an
21 opinion as to whether the onset of releases due to a nuclear
22 incident would be gradual or instantaneous?

23 A They should be gradual.

24 Q Have you ever read the Zimmer Station Radiological
25 Emergency Plan?

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A No, sir, I don't believe I have.

(Pause.)

MR. WETTERHAHN: No further questions.

JUDGE FRYE: Mr. Barth?

CROSS EXAMINATION

BY MR. BARTH:

Q Mr. Feldkamp, I direct your attention to page five of your testimony, sir, lines 8 and 19, wherein you state that "I received a telephone call and was advised that the life squad would not be needed." The second reference is you testified that you and your group were prepared and available to participate in the November 18 exercise.

A Yes, sir.

Q How are you normally notified that you will be called? How are you normally notified, sir, that you will be needed for your duties?

A By the Plectron and Minitor.

Q Are those the same as the beeper you carry on your belt which went off at the beginning of your testimony?

A No, sir, it's somewhat different.

Q Where are the Plectron's located, sir, in your house?

A The Plectron is located in our homes.

Q And you carry the beeper when you are not in your home?

A That's correct.

1 Q This is the primary method by which you are notified
2 that you have a duty or a call to duty?

3 A That's right.

4 Q Are they both, to the best of your knowledge,
5 reliable, sir?

6 Yes, sir, they always have been.

7 Q How far from here to the station would you set your
8 beeper off?

9 A I didn't understand.

10 Q How far away from here is the transmitter that sets
11 your beeper off?

12 A For the life squad?

13 Q You have a beeper on your belt.

14 A Oh, the beeper I have on my belt is for my job here
15 in the city and there are towers right within the city here
16 that sets this off, so this is really far closer than the
17 station would be for setting off the Minitors that we have.

18 MR. BARTH: I have no further questions of the
19 witness. Thank you, sir.

20 MR. CASSIDY: I have a few brief ones.

21 CROSS EXAMINATION

22 BY MR. CASSIDY:

23 Q Mr. Feldkamp, with regard to the training you stated
24 you received earlier in your testimony, when did you undergo
25 that training? Do you recall?

1 A The exact date I couldn't give you. It was in the
2 fall.

3 Q If I suggested to you it might have been earlier than
4 that, around June of 1981, would that refresh your recollection?

5 A It could possibly have been.

6 Q And how many members of the fire department and life
7 squad attended that training, if you can recall?

8 A I believe it was somewhere around 12. I think I
9 stated that earlier.

10 MR. DENNISON: I was just going to ask for a clari-
11 fication, did he mean New Richmond or did he mean all fire
12 life squad.

13 MR. CASSIDY: I meant New Richmond.

14 BY MR. CASSIDY: (resuming)

15 Q If I suggested to you that the number may have been
16 as high as 21 would that refresh your recollection?

17 A No, sir, I don't believe so. I am talking about
18 people, maybe, that completed. On the night of the actual
19 sign-up I believe there were more people than actually
20 completed. I could be off on the number, but I don't think I'm
21 that far off.

22 Q By "completed" do you mean attended all 12 to 16
23 hours of the training?

24 A That's right.

25 Q With regard to your testimony on cross examination

1 and you stated in your written testimony and on cross you
2 stated that several of the people on the life squad indicated
3 they may or may not respond to an accident at Zimmer, is that
4 correct?

5 A That's correct.

6 Q I wanted to try and be clear on one point that you
7 stated. Were you referring -- is it your understanding that
8 they were talking about an accident at the Zimmer site?

9 A At the Zimmer site in connection with a radiation
10 release, yes, sir.

11 Q They were not saying that they would not perform
12 their function in Clermont County away from Zimmer, is that
13 correct?

14 A No, sir, they didn't say that.

15 Q So your testimony is in effect that they would
16 perform their required functions in Clermont County outside of
17 the Zimmer facility, is that correct?

18 A That's correct. The select few that you have on the
19 life squad probably would, yes, sir.

20 Q With regard to those who said they would respond, I
21 am asking and I understand from your last answer, that they
22 would respond to a call to perform their functions in Clermont
23 County but not to go to Zimmer, is that correct?

24 A When you talk about their functions are you talking
25 about their functions in regard to a radiological release, or

1 are you talking about their functions as EMTs?

2 Q I am talking in regard to their functions that the
3 Clermont County Radiological Emergency Plan asks them to
4 perform.

5 A I only have three members on the life squad that are
6 capable, that have had the training to do any kind of monitoring
7 or checking in any of the relocation centers or anything in
8 connection with any kind of radiation.

9 Q With regard to the other functions that the plan
10 also addresses to the fire department and life squad personnel,
11 that being checking doors and checking homes in Clermont
12 County to see if people are evacuated, is it your understanding
13 that these people that indicated that they would not go to
14 Zimmer would perform that function within Clermont County?

15 A I believe there is a little confusion here. I
16 think when you are addressing that question you are addressing
17 that to me as the life squad and it's the fire department's
18 primary duty to check the door-to-door, make the door-to-door
19 check.

20 Q Wearing your hat as a fire department official as
21 opposed to a life squad official, would the members that
22 indicated to you that they would not go to Zimmer perform their
23 duty within Clermont County, performing the function of door-to-
24 door checks?

25 A Well, I still think the question is somewhat

1 confused for the simple reason that the people that told me
2 that they would not respond are life squad people, and the life
3 squad people are not involved in the door-to-door check.

4 Q Okay, so it's only your life squad people; it's not
5 the people in the fire department, then, is that correct?

6 A Right.

7 Q Okay, and of the three people that you said you had
8 who were qualified to perform the monitoring functions in the
9 life squad, I believe your testimony is those people would
10 perform these functions within Clermont County.

11 A Well, I have lost one of those members since then,
12 so we're down to two.

13 Q Would you answer the question, whether they would
14 respond to their function in Clermont County?

15 A I believe they would, yes, sir.

16 MR. CASSIDY: Thank you. Nothing further, Your
17 Honor.

18 JUDGE FRYE: Mr. Dennison?

19 MR. DENNISON: Thank you, Your Honor.

20 REDIRECT EXAMINATION

21 BY MR. DENNISON:

22 Q Mr. Feldkamp, you were asked some questions about
23 acceptance of risk. Do volunteer firemen accept all risk, or
24 are they given the latitude of rejecting some risk as volunteers?

25 A As a volunteer if a man is afraid to go to a top of

1 65-foot aerial, he is not made to go to the top of it. If he
2 is afraid to do it, he isn't made to do it.

3 Q All right. As to the life squad personnel,
4 volunteers in New Richmond, are they required, as a result of
5 their volunteer responsibility when they become a life squad
6 member, to accept any and all risk which would be attendant
7 to them discharging their duties as a life squad person?

8 A I believe so.

9 Q Would this include radiological exposure as a risk
10 to be accepted?

11 A I really can't say that honestly.

12 Q Now you had stated in response to a question that
13 you would perform your duties as well as you could during some
14 accident at the Zimmer station.

15 A Yes, sir.

16 Q Would you be in a position of performing those
17 duties if the accidental release or the accident and its
18 related release at Zimmer was sufficient to cause the declaration
19 of evacuation of the populus of New Richmond? Would you still
20 be in a position to perform your duties?

21 A No, sir.

22 Q What duties would you perform under a circumstance
23 in which there was evacuation of the New Richmond area relative
24 to an accident at the Zimmer station?

25 A First off, I would get my family out of town.

1 Q All right, have you had any opportunity to -- of your
2 own knowledge, to know what the circumstance would be as to the
3 fireman and the life squad personnel of the New Richmond Life
4 and Fire Squad relative to whether they would respond during an
5 evacuation circumstance at Zimmer to their families or to their
6 duties as either firefighters or life squads?

7 MR. WETTERHAHN: Objection, this is repetitive to the
8 direct.

9 JUDGE FRYE: I think it does sound like it may be a
10 bit repetitive to the direct.

11 MR. DENNISON: However, we had not -- at least my
12 recollection of the direct, scanning through it some moments
13 ago, it was not clearly touched upon but it was inquired into on
14 cross examination relative to these different circumstances in
15 which Mr. Feldkamp in many instances dealing with verification
16 stated that he would hope so, as it pertained to residents and
17 part as it pertained to volunteers.

18 JUDGE FRYE: All right, we'll allow it.

19 BY MR. DENNISON: (resuming)

20 Q Do you recall the question?

21 A I am going to answer it like this. I feel that you
22 have got a select few people that would probably respond. I
23 feel that it is the duty of the majority of the members to make
24 sure that their families are taken care of first, and then I
25 would say it would go from there.

1 Q Thank you, Mr. Feldkamp. You were asked about the
2 -- your personal knowledge of the population in and around New
3 Richmond as it related to flooding. Related to flooding, have
4 there been certain plans in existence relative to the evacuation
5 or at least to the people leaving their homes which were soon
6 to come into some sort of water involvement?

7 A Well, everyone who has ever lived in the New Richmond
8 area knows at approximately what water level the water will
9 get their homes. So for that reason there is some preplanning
10 involved insofar as they know when they have to leave.

11 Q All right, and with the presence of this preplanning
12 what has been your experience as to those individuals actually
13 leaving at the designated time?

14 A I have seen times that everyone has just sat without
15 ever makin the first move.

16 Q All right, and did that require some police involve-
17 ment in the area of New Richmond?

18 A I would say it has, yes, sir.

19 Q All right. Now you indicated in response to a question
20 -- I believe the way the question was put was the utilization
21 of State Route 132 and U.S. 52 as a race course. For what
22 reason would that be utilized as a race course during an
23 evacuation at the Zimmer station? What would be the reason that
24 it would become a race course?

25 A Because those are the two basic routes that we have

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out of the Village of New Richmond in the direction that we
 would have to go to leave the plume area.

id 14a

300 7TH STREET, S.W., REPORTERS BUILDING, WASHINGTON, D.C. 20024 (202) 554-2345

1 Q What I am getting to is I recognize those as
2 evacuation routes. What I am getting to is your characterization
3 -- the underlying reason for your characterization that these
4 would be race courses.

5 A Okay, if everyone was given a specific time, say,
6 let's evacuate the area because we've got a radiological release
7 at Zimmer, you would have up to -- you know, you can safely
8 evacuate within three hours. It would be the case everybody
9 would wait until two hours and 45 minutes of that hour w's
10 gone and then everybody would be in a rush.

11 Q Now you were asked a question of your understanding
12 from your radiological training whether or not the release
13 would be gradual. Is it your understanding that all accident
14 progress and related radiation release is on a gradual basis?

15 A That was the way I understood it, yes, sir.

16 Q In all instances?

17 A Yes, sir, it was.

18 Q Now you have indicated that if the population with
19 which you would involved in door-to-door verification as a fire-
20 man, as to whether that population would place either a towel or
21 a green card to advise notification, you indicated that you
22 had hoped so.

23 A Yes, sir, I did.

24 Q My question to you is based upon your knowledge of
25 that community. What is the likelihood that they will place any

1 sort of notice such as the green card or the towel?

2 MR. WETTERHAHN: Objection. It is contained in the
3 direct testimony, in the written testimony.

4 MR. DENNISON: It was touched upon on direct.

5 JUDGE FRYE: It was also gone into on cross.

6 MR. WETTERHAHN: On cross no other area was opened up.
7 It was merely repetition of direct. I don't see why this
8 opens up this to additional subjects on redirect.

9 JUDGE FRYE: As I recall, he was asked specifically
10 whether he thought people would follow instructions with
11 regard to placing those cards and towels and what not. I think
12 it's proper.

13 BY MR. DENNISON: (resuming)

14 Q Do you recall your response to that question by Mr.
15 Wetterhahn was that you hoped so? My question is based upon
16 your knowledge and experience of the community with which you
17 must deal in this door-to-door verification as a fireman, as to
18 whether or not that posted verification will be present.

19 A I believe that you and I talked about this once
20 before and I gave you a number somewhere around fifty percent
21 probably would.

22 Q Now, taking fifty percent that would, as to the
23 fifty percent who would not, I believe you testified on cross
24 that this would indeed slow down the verification process by
25 the fireman.

1 A It would because we would have to go knock on a door
2 and wait for a response.

3 Q During your radiological training has anyone indicated
4 to you that time is of any importance during the release into
5 the atmosphere of radioactive discharges from the Zimmer station
6 in an accident situation?

7 A We are able to monitor ourselves to the point that
8 we know when we are starting to get into the danger area so
9 that we can leave.

10 Q If you get into that danger area, as I assume would
11 be indicated to you by your pocket dosimeters --

12 A Right, sir.

13 Q -- and you had not completed the door-to-door verifi-
14 cation, are you aware of any type of relief or alternate plan
15 to relieve you to continue that door-to-door verification after
16 you have come to the, let us say, saturation limit by your
17 dosimeter?

18 A No, sir, I know of none.

19 Q Having achieved that particular level by the reading
20 of your dosimeter, what would you and your fellow firemen do
21 in such circumstances?

22 A Well, I hope we would be ready to leave.

23 MR. DENNISON: I have nothing further, Your Honor.

24 (Board conferring.)

25 JUDGE FRYE: The Board has no questions. Mr. Feldkamp,

1 we thank you very much for being with us today. We appreciate
2 your testimony.

3 THE WITNESS: Thank you.

4 (The witness was excused.)

5 JUDGE FRYE: Let's take about a fifteen minute
6 recess before we go to the next witness. Off the record.

7 (A brief recess was taken.)

8 JUDGE FRYE: Shall we go back on the record?

9 JoEtta Goode, I understand, is next.

10 MR. DENNISON: Yes.

11 Whereupon,

12 JOETTA GOODE

13 was called as a witness by counsel for Intervenor Zimmer Area
14 Citizens and, having been duly sworn, was examined and testified
15 as follows:

16 DIRECT EXAMINATION

17 BY MR. DENNISON:

18 Q Would you state and spell your name for the record,
19 please?

20 A JoEtta Goode, the first name J-e-e-t-t-a, G-o-o-d-e.

21 Q And your business address, Mrs. Goode?

22 A 233 Main, Batavia, Ohio.

23 Q Now, Mrs. Goode, I will hand you a document which
24 states direct testimony of JoEtta Goode, and which purports to
25 bear your signature, executed under oath on January 7, 1982. I

February 19, 1988 Memorandum and Order makes no statement about extending "the discovery period in part to give us time to resolve this dispute," as LILCO's counsel alluded to in his February 23, 1988 letter. What the Memorandum and Order does say is that the Board extended discovery from February 19, 1988 to February 26, 1988 "for the purpose of completing depositions on designated witnesses." Since the State of New York has not designated Mr. Papile as a witness, and since LILCO's Second Set of Requests for Admissions is not a deposition, LILCO's Second Set of Requests for Admissions is an untimely, unauthorized form of discovery. Without waiving this objection, the State of New York responds as follows.

LILCO's Requests for Admissions Nos. 7-8

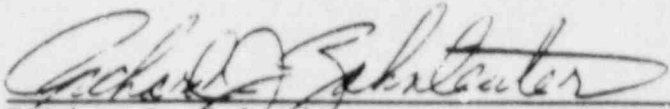
7. Bus driver training conducted in accordance with plans for nuclear plants in New York State other than Shoreham does not address caring for families of bus drivers in emergencies. Response of the State of New York to LILCO's Second Set of Interrogatories and Requests for Production of Documents Regarding Role Conflict of School Bus Drivers and Amendment and Supplementation of the State of New York's Response to LILCO's First Set of Interrogatories and Requests for Production of Documents Regarding Role Conflict of School Bus Drivers (Jan. 27, 1988) at 6 (Interrogatory No. 27).

Response: The State of New York admits that the pleading referenced in LILCO's Request for Admissions No. 7 contains the following statement, which was verified as being true then and remains true now: "Without agreeing to the relevancy of this interrogatory, upon information and belief, bus driver training

conducted in accordance with plans for nuclear plants in New York State other than Shoreham does not address caring for families of bus drivers in emergencies."

8. Other than information or documents submitted or developed in the emergency planning proceedings in 1983-1984, the State of New York has not been able, to date, to locate any instances of bus drivers, in any emergency, attending to the safety of their own families before reporting to perform their bus driving duties. *Id.* at 4 (Interrogatory No. 24); Response of the State of New York to LILCO's Third Set of Interrogatories and Requests for Production of Documents Regarding Role Conflict of School Bus Drivers (Feb. 10, 1988) at 8-10 (Interrogatory Nos. 35-37).

Response: The State of New York admits that the pleading referenced in LILCO's Request for Admissions No. 8 contains the following statement concerning LILCO Interrogatories Nos. 35-37, which statements were true then and are true now, with one qualification: "Other than information or documents submitted or developed in the emergency planning proceedings in 1983-1984, the State of New York has not been able, to date, to locate any responsive information or documents within the possession, custody or control of the State of New York." The qualification is that, upon information and belief, instances of bus drivers attending to the safety of their own families before reporting to perform their bus driving duties in any emergency have been referenced or discussed in discovery, such as depositions, of which LILCO is fully aware, that has occurred subsequent to the filing of the pleading referenced in LILCO's Request for Admissions No. 8.



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February 1, 1988

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)
(Shoreham Nuclear Power Station,)	
Unit 1))	
_____)	

RESPONSE OF SUFFOLK COUNTY, THE STATE OF NEW YORK, AND
THE TOWN OF SOUTHAMPTON TO LILCO'S FIRST SET OF
REQUESTS FOR ADMISSIONS REGARDING THE REMAND
ISSUE OF "ROLE CONFLICT" OF SCHOOL BUS DRIVERS

On January 20, 1988, LILCO filed its "First Set of Requests for Admissions Regarding the Remand Issue of 'Role Conflict' of School Bus Drivers" (hereafter, "First Request for Admissions"). Pursuant to 10 CFR § 2.742, Suffolk County, the State of New York and the Town of Southampton (hereafter, "the Governments") hereby respond to LILCO's First Request for Admissions.

LILCO Admission No. 1

1. That the Radiological Emergency Preparedness Plan for Westchester County (Rev. 1/87) ("Westchester County Plan") states that, in the event of a radiological emergency at the Indian Point nuclear power station, bus companies under contract to school districts in the EPZ will provide a sufficient number of buses and drivers to support the evacuation of schoolchildren, in the following words:

Bus companies providing service to individual school districts will maintain their normal

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responsibilities to the school districts until all schoolchildren have been moved to their homes or predesignated school reception centers as directed.

Westchester County Plan at A-20.

Response

Without conceding the relevance of the requested admission, the Governments admit that the Westchester County Plan (at page A-20) states, in part, as follows:

Bus companies providing service to individual school districts will maintain their normal responsibilities to the school districts until all schoolchildren have been moved to their homes or predesignated school reception centers as directed.

LILCO Admission No. 2

That the Westchester County Plan assumes that, in the event of a radiological emergency at the Indian Point nuclear power station, the evacuation of schoolchildren will not be adversely affected by "role conflict" among school bus drivers, in the following words:

d. Assumptions: . . . (3) That sufficient numbers of Westchester County public school bus drivers WILL respond to perform evacuation assignments.

Westchester County Plan at A-29 (emphasis in original).

Response

Without conceding the relevance of the requested admission, the Governments admit that the Westchester County Plan (at page A-29) states as follows:

d. Assumptions: . . . (3) That sufficient numbers of Westchester County public school

bus drivers WILL respond to perform evacuation assignments.

The Westchester County Plan also states, however, that in the event of a radiological emergency at the Indian Point nuclear power station:

- d. Assumptions: . . . (2) That some or all of the Westchester commercial bus drivers will NOT respond

Westchester County Plan at A-29 (emphasis in original).

LILCO Admission No. 3

That the Wayne County Radiological Emergency Preparedness Plan (Rev. 4 10/1/86) ("Wayne County Plan") provides that, in the event of a radiological emergency at the Robert E. Ginna nuclear power station, additional buses will be provided to schools as needed by the local response organization to effect a single wave evacuation:

Evacuating schools within the 10 mile EPZ without adequate transportation to transport their entire student body in one coordinated move will be furnished additional buses or transportation on a priority basis by the County Response Organization. When these schools are in session, this action may require that students be held at the school pending further instructions. If required this information will be announced to parents over the EBS broadcast system.

Wayne County Plan at A-8.

Response

Denied. Without conceding the relevance of the requested admission, the Governments admit that, under the Wayne County Plan, School Districts and BOCES Superintendents are requested to address a number of "coordinating instructions." In Request No.

3, however, LILCO has taken separate "coordinating instructions" and combined them into what would appear to be one instruction. The Governments therefore object to and deny Request No. 3.

LILCO Admission No. 4

That the Wayne County Plan provides that, in the event of a radiological emergency at the Robert E. Ginna nuclear power station, buses from outside the EPZ will be used if necessary to support the evacuation of schoolchildren:

Upon receipt of notification of any emergency at GINNA, School Superintendents with schools outside the 10 mile EPZ will be requested to immediately place their school bus fleet and drivers on standby for possible dispatch to an evacuating school or the general public within the EPZ.

Wayne County Plan at A-8.

Response

Without conceding the relevance of the requested admission, the Governments admit that, under the Wayne County Plan, School District and BOCES Superintendents are requested to address a number of "coordinating instructions," one of which partially reads as follows:

Upon receipt of notification of any emergency at GINNA, School Superintendents with schools outside the 10 mile EPZ will be requested to immediately place their school bus fleet and drivers on standby for possible dispatch to an evacuating school or the general public within the EPZ.

Wayne County Plan at A-8.

LILCO Admission No. 5

That the Wayne County Plan provides that, in preparing their individual school evacuation plans, the School District Superintendents should provide for backup school bus drivers, as follows:

Alternate bus drivers should be identified, predesignated, and trained (from the school staff).

Wayne County Plan at A-7.

Response

Without conceding the relevance of the requested admission, the Governments admit that, under the Wayne County Plan, School District and BOCES Superintendents are requested to address a number of "coordinating instructions," one of which reads as follows:

(iv) Alternate bus drivers should be identified, predesignated, and trained (from the school staff).

Wayne County Plan at A-7.

LILCO Admission No. 6

That the Oswego County Radiological Emergency Preparedness Plan (Rev. 7/85) ("Oswego County Plan") provides that in the event of a radiological emergency at the Nine Mile Point or James A. FitzPatrick nuclear power plants, bus companies under contract to the school districts in the EPZ will provide a sufficient number of buses and drivers to support the evacuation of schoolchildren, in the following words:

Bus companies providing service to individual school districts will maintain their normal responsibilities to the school districts until

all schoolchildren have been moved to their homes or to the predesignated reception center.

Oswego County Plan, Appendix A, Attachment 3 at 17.

Response

Without conceding the relevance of the requested admission, the Governments admit that the Oswego County Plan, at Appendix A, Attachment 3 at 17, states, in part, as follows:

Bus companies providing service to individual school districts will maintain their normal responsibilities to the school districts until all schoolchildren have been moved to their homes or to the predesignated reception center.

Respectfully submitted,

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February 1, 1988

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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)

CERTIFICATE OF SERVICE

I hereby certify that copies of RESPONSE OF SUFFOLK COUNTY, THE STATE OF NEW YORK, AND THE TOWN OF SOUTHAMPTON TO LILCO'S FIRST SET OF REQUESTS FOR ADMISSIONS REGARDING THE REMAND ISSUE OF "ROLE CONFLICT" OF SCHOOL BUS DRIVERS have been served on the following this 1st day of February, 1988 by U.S. mail, first class, except as noted:

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ARTICLE 19-A—SPECIAL REQUIREMENTS FOR BUS DRIVERS

Section

- 509-a. Definitions.
- 509-b. Qualifications of bus drivers.
- 509-c. Disqualification of bus drivers generally.
- 509-cc. Disqualification of drivers of school buses.
- 509-d. Qualification procedures for bus drivers, maintenance of files and availability to subsequent employers.
- 509-e. Annual review of driving record.
- 509-f. Record of violations.
- 509-g. Examinations and tests.
- 509-h. Operation by person not licensed to drive a bus.
- 509-i. Notification of a conviction resulting from a violation of this chapter in this state or a motor vehicle conviction in another state and license revocation.
- 509-j. Compliance required.
- 509-k. Ill or fatigued operator.
- 509-l. Drugs, controlled substance and intoxicating liquor.
- 509-m. Duties of the department.
- 509-n. Exempt carriers; reporting requirements.
- 509-o. Penalties.

New York Codes, Rules and Regulations

Special requirements for bus drivers, see 15 NYCRR Part 6.

§ 509-a. Definitions

As used in this article the term: (1) bus shall mean every motor vehicle, owned, leased, rented or otherwise controlled by a motor carrier, which: (a) is a school bus as defined in section one hundred forty-two of this chapter or has a seating capacity of more than ten adult passengers in addition to the driver and which is used for the transportation of persons under the age of twenty-one to a place of vocational, academic or religious instruction or service including schools and camps or, (b) is required to obtain approval to operate in the state as a common or contract carrier of passengers by motor vehicle from the commissioner of transportation, the New York city bureau of franchise or the interstate commerce commission, or (c) is operated by a transit authority or municipality and is used to transport persons for hire. Provided, however, that bus shall not mean an authorized emergency vehicle operated in the course of an emergency, or a motor vehicle used in the transportation of agricultural workers to and from their place of employment;

(2) driver or bus driver shall mean every person: (i) who is self-employed and drives a bus for hire or profit; or (ii) who is

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employed by a motor carrier and operates a bus owned, leased or rented by such employer, or (iii) who as a volunteer drives a bus which is owned, leased or rented by a motor carrier. Provided, however, bus driver shall not include those persons who are engaged in the maintenance, repair or garaging of such buses and in the course of their duties must incidentally drive a bus without passengers, or who, as a volunteer, drive a bus with passengers for less than thirty days each year;

(3) motor carrier shall mean any person, corporation, municipality, or entity, public or private, who directs one or more bus drivers and who operates a bus wholly within or partly within and partly without this state in connection with the business of transporting passengers for hire or in the operation or administration of any business, or place of vocational, academic or religious instruction or service for persons under the age of twenty-one including schools and camps, or public agency, except such out-of-state public or governmental operators who may be exempted from the provisions of this article by the commissioner through regulation promulgated by the commissioner;

(4) intoxicating liquor shall mean and include, alcohol, spirits, liquor, wine, beer and cider having alcoholic content;

(5) drug shall mean any substance listed in section thirty-three hundred six of the public health law not dispensed or consumed pursuant to a lawful prescription;

(6) controlled substance shall mean any substance listed in section thirty-three hundred six of the public health law not dispensed or consumed pursuant to lawful prescription.

(Added L.1974, c. 1050, § 1; amended L.1975, c. 853, § 1; L.1979, c. 740, § 1; L.1984, c. 843, §§ 3, 4; L.1985, c. 675, § 1.)

Historical Note

1985 Amendment. Subd. (1). L.1985, c. 675, § 1, eff. Sept. 1, 1985, in sentence beginning "As used in" inserted in cl. (a) provisions relating to number of passengers and use of a school bus, added cls. (b) and (c) and omitted former cls. (b) and (c) which related to seating capacity; in sentence beginning "Provided, however" deleted reference to vanpool vehicle.

Subd. (2). L.1985, c. 675, § 1, eff. Sept. 15, 1985, reorganized the text and inserted references to volunteers.

Subd. (3). L.1985, c. 675, § 1, eff. Sept. 15, 1985, substituted "directs" for

"employs" and "or place of vocational, academic or religious instruction or service for persons under the age of twenty-one including schools and camps," for "school, camp".

Subd. (5). L.1985, c. 675, § 1, eff. Sept. 15, 1985, added subd. (5).

Subd. (6). L.1985, c. 675, § 1, eff. Sept. 15, 1985, added subd. (6).

1984 Amendment. Subd. (1). L.1984, c. 843, § 3, eff. Aug. 5, 1984, substituted "vanpool vehicle" for "motor vehicle used in vanpooling operations".

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'88 JUN 27 P6:43

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

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

I hereby certify that copies of LILCO'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW IN THE FORM OF A PARTIAL INITIAL DECISION ON THE REMAND ISSUES OF SCHOOL BUS DRIVER ROLE CONFLICT AND HOSPITAL EVACUATION TIME ESTIMATES (ETEs) were served this date upon the following by telecopier as indicated by one asterisk, by Federal Express as indicated by two asterisks, or by first-class mail, postage prepaid.

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