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OFFICE OF SECRETARY

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)

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Docket No. 50-322-OL-3
(Emergency Planning
Proceeding)

LILCO'S PROPOSED FINDINGS OF FACT AND
CONCLUSIONS OF LAW ON OFFSITE EMERGENCY PLANNING

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October 5, 1984

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INTRODUCTION

I. PROCEDURAL HISTORY

1. This Partial Initial Decision addresses the question whether the offsite emergency plan for the Shoreham Nuclear Power Station satisfies NRC regulations, namely 10 C.F.R. § 50.47 and 10 C.F.R. Part 50 Appendix E. In deciding that question we give considerable weight to the FEMA-NRC guidelines in NUREG-0654, FEMA-REP-1.1/

2. This case represents the first time that an NRC applicant has had to take the entire responsibility for offsite planning. LILCO has done this by preparing an offsite emergency response plan, known as the "LILCO Transition Plan," and by setting up an emergency plan implementing organization known as "LERIO" (Local Emergency Response Implementing Organization). The organization that would implement the plan in an emergency is known as "LERO" (Local Emergency Response Organization). LERO is composed primarily of LILCO employees and contractors, working with support organizations such as the American Red Cross, the U.S. Coast Guard, the U.S. Department of Energy, and local bus, ambulance, and aircraft companies. See LILCO Transition Plan, LILCO Ex. 80,2/ Chap. 2.

3. Onsite preparedness was addressed in "Phase I" of this proceeding, when Intervenor Suffolk County, the Shoreham Opponents Coalition, the North Shore Coalition, and the Town of Southampton raised issues about

1/ See Consolidated Edison Co. (Indian Point, Unit No. 2), LPB-83-68, 18 NRC 811, 944 n.71 (1983).

2/ The LILCO Transition Plan will be cited herein as simply "Plan."

LILCO's onsite emergency plan, as well as those elements of offsite preparedness for which LILCO had responsibility and which could be litigated at that time, before the preparation of an offsite plan. In November 1982 the Intervenor³ refused to go forward with the litigation of these issues and were held in default. Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-82-115, 16 NRC 1923 (1982). Today's decision, covers "Phase II" of the proceeding.

4. On February 17, 1983 the government of Suffolk County decided not to participate in offsite emergency planning for Shoreham and to oppose the opening of the plant. Thereupon Suffolk County made a formal motion to terminate this proceeding, arguing that without its participation LILCO could not meet NRC planning regulations. This claim was rejected. Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-83-22, 17 NRC 608, aff'd, CLI-83-13, 17 NRC 741 (1983). LILCO then prepared its own offsite emergency plan, which it submitted to the NRC on May 26, 1983. Upon the submission of this plan, the County asked the Board to reject it without further proceedings. The Board denied the request. Memorandum and Order Denying "Motion for Rejection of LILCO Transition Plan and for Certification to the Commission," Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1) (August 30, 1983) (unpublished).

5. The litigation of the "Phase II" issues proceeded. The Intervenor³ submitted 97 contentions, with numerous subparts, dated July 26,

^{3/} The original 97 contentions were cosponsored by Suffolk County, the Shoreham Opponents Coalition, the North Shore Coalition, and the Town of Southamton. The last three of these parties, however, took no part in the hearings.

1983.^{4/} LILCO revised its emergency plan on July 28, 1983 (Revision 1), on November 7, 1983 (Revision 2), and on December 21, 1983 (Revision 3).^{5/} and the Intervenor revised the contentions as of January 12, 1984. Additional contentions were later admitted on the LILCO training program, Order Ruling on Suffolk County Motion for Leave to File New Contentions Concerning the LILCO Offsite Emergency Preparedness Training Program (Mar. 19, 1984) (unpublished), and modified ones on the public education brochure, Order Reconsidering Memorandum and Order Ruling on Suffolk County's Motion for Leave to File Modified Contentions 16 and 18 Concerning the LILCO Public Education Brochure (Apr. 10, 1984) (unpublished). Finally, the Board raised sua sponte the issue of the effect on emergency preparedness of a strike by LILCO union employees. Memorandum and Order Determining that a Serious Safety Matter Exists (July 24, 1984). Some parts of the contentions were ruled inadmissible by the Board.^{6/} The Intervenor withdrew one contention (51). A few others were resolved by summary disposition.^{7/} The

^{4/} Suffolk County also attempted to raise new issues about onsite emergency preparedness, but these contentions were not admitted. Memorandum and Order Denying Suffolk County Motion for Leave to File Contentions Regarding Onsite Emergency Planning (Aug. 5, 1983) (unpublished).

^{5/} Revision 2 is LILCO Exhibit 1; Revision 3 is LILCO Exhibit 80. Revision 4, issued June 29, 1984, was not entered into the record, except for selected portions that LILCO included as attachments to written testimony.

^{6/} Special Prehearing Conference Order (Aug., 19, 1983) (unpublished); Order Ruling on Objections to Special Prehearing Conference Order (Sept. 30, 1983) (unpublished); Memorandum and Order Ruling on Intervenor's Proposed Emergency Planning Contentions Modified to Reflect Revision 3 of the LILCO Plan (Feb. 3, 1984) (unpublished); Order Ruling on Suffolk County Objections to Memorandum and Order Ruling on Intervenor's Proposed Modified Emergency Planning Contentions (Feb. 28, 1984) (unpublished).

^{7/} Order Ruling on LILCO's Motions for Summary Disposition of Contentions 24.B, 33, 45, 46 and 49 (Apr. 20, 1984) (unpublished); Memorandum

first ten contentions, which allege that LILCO's Plan is illegal under various state and local laws, are addressed separately in our decision on LILCO's Motion for Summary Disposition of those issues. The remaining contentions are addressed in this decision.

6. On January 17, 1984 the State of New York made an appearance by counsel at the hearings and announced its full support of Suffolk County's position. Tr. 2239. Since that time New York has participated in the hearings and, as promised, has supported the County in every respect.

7. The hearings began December 6, 1983 and continued over nine months, until August 29, 1984, when the record was closed. Eighty-six witnesses testified, many of them on multiple issues; the transcript numbered 15,714 pages, not counting exhibits and prefiled written testimony, which add over 7000 more.

8. On the basis of this record the Board concludes that LILCO has met its burden of proof with respect to the contentions before us and that, upon the completion by LILCO of certain tasks specified below and upon incorporation into the station technical specifications of the license condition set out in Section XV below, none of the issues discussed herein will be a bar to the issuance of a full-power, full-term operating license for the Shoreham Nuclear Power Station.

(footnote continued)

and Order Ruling on LILCO's Motion for Summary Disposition of Contentions 16.E, J, K, L and M (Public Information Brochure) (June 28, 1984) (unpublished).

9. All of the proposed findings of fact and conclusions of law submitted by the parties have been considered. Those not incorporated directly or inferentially in this decision are rejected as unsupported in fact or law or as unnecessary to the rendering of this decision.

II. BASIC PRINCIPLES OF EMERGENCY PLANNING

10. At the outset it will be helpful to state certain principles of emergency planning that arise out of the NRC regulations and case law.

A. Level of Detail

11. The role of atomic safety and licensing boards, as the Appeal Board made clear in the Waterford case,^{8/} is not to become enmeshed in trivial detail.^{9/} During the course of this Shoreham proceeding this Board often heard evidence in more detail than is required by NRC regulations, and some of the Intervenor's contentions have raised subjects that are not listed in the 16 standards for offsite emergency response plans in 10 C.F.R. § 50.47(b)(1984). See, e.g., Memorandum and Order Denying LILCO's Motion to File Surrebuttal Testimony on Phase II Emergency Planning Contention 67 at 4-5 (July 9, 1984). Therefore, the fact that evidence is in the record does not necessarily mean it is material to the issues this Board must decide.

^{8/} Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), ALAB-732, 17 NRC 1076, 1107 (1983).

^{9/} Emergency plans are to be kept "as concise as possible." NUREG-0654 at 29; Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit 1), LBP-82-48, 15 NRC 1549, 1575 (1982), aff'd with modifications, ALAB-727, 17 NRC 760 (1983).

B. Predictive Nature
of Emergency Planning Findings

12. Emergency planning findings are different from other safety findings that licensing boards must make in that they are "predictive."^{10/} The applicant is not required to prove, and the Board is not required to find, that the present state of emergency planning is fully adequate.^{11/} Rather, the Board is required only to find that there are no "insurmountable difficulties" to the successful completion of planning, no "barriers . . . that cannot feasibly be removed."^{12/}

C. No Absolute Assurance

13. Throughout this proceeding various Intervenor witnesses and lawyers have suggested that their standard for the adequacy of an emergency plan is that it provide a "guarantee" of safety. See, e.g., Tr. 3171, 11,085 (Petrilak); Jeffers and Rossi (Direct Testimony), ff. Tr. 3087, Att. 1, at 3, ¶ 3. No such standard is found in NRC regulations or guidelines. Indeed, an underlying assumption of the emergency planning regulations is that in a serious accident people might receive harmful doses of radiation. Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 & 3), CLI-83-10, 17 NRC 528, 533 (1983). The objective of emergency planning is maximum dose "savings."^{13/} And one licensing board has observed that

^{10/} Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), ALAB-732, 17 NRC 1076, 1103 (1983).

^{11/} Id.

^{12/} Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 764 (1982); Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), ALAB-732, 17 NRC 1076, 1104 (1983).

^{13/} Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit No. 1), ALAB-727, 17 NRC 760, 770 (1983).

under worst-case fast-moving accidents no emergency plan can be expected to work very well.^{14/}

14. Reasonable assurance,^{15/} as required by NRC regulations, does not mean perfect assurance or zero risk. Thus, the Board does not have to find that all individuals are covered by the plans under all circumstances. Duke Power Co. (Catawba Nuclear Station, Units 1 & 2), LBP-84-37, 20 NRC ___, slip op. at 7 (Sept. 18, 1984).^{16/} There is no requirement that extraordinary measures, such as building shelters or stockpiling blankets, be undertaken. San Onofre, *supra*, 17 NRC at 533; NUREG-0396 at 14-15.^{17/}

15. Nevertheless, the Intervenor has frequently proceeded as though LILCO must provide perfect assurance of safety. For example, there was a great deal of contention about the speed of evacuation, both of the public and of special groups, and yet it is clear that NRC regulations impose no maximum evacuation time.^{18/} What is required is that the evacuation time

^{14/} Consumers Power Co. (Big Rock Point Plant), LBP-83-44, 18 NRC 201, 207 (1983).

^{15/} As a general matter, "the courts have long accepted the Commission's definition of its statutory mandate . . . as requiring not a risk-free environment, but a 'reasonable assurance . . . that the reactor could be safely operated at the proposed location.'" Carstens v. NRC, No. 83-1879, slip op. at 22 (D.C. Cir. Sept. 7, 1984).

^{16/} See also Union Elec. Co. (Calloway Plant, Unit 1), LBP-83-71, 18 NRC 1105, 1112 (1983) (it is not a governmental requirement that emergency response plans formulate protective actions for every conceivable development during a radiological release).

^{17/} Cf. Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 996 (1983) (government cannot bear total burden of protecting the mobility-impaired; family and friends do have a responsibility).

^{18/} Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit No. 1), ALAB-727, 17 NRC 760, 770 (1983); see also Consolidated Edison Co.

estimates be reliable^{19/} and that attention be paid to the efficiency of evacuation.^{20/} There has never been a case where an emergency plan was rejected because the evacuation times were too high, and there are power plants that have evacuation times comparable to or larger than those for Shoreham.

Cordaro et al., ff. Tr. 2333, at 47. Likewise, there is no requirement that evacuation be possible under all circumstances. Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 & 3), LBP-82-39, 15 NRC 1163, 1184 (1982).

16. Thus, the NRC does not require a perfect emergency plan, nor perfect assurance, and many of the shortcomings Suffolk County and New York sought to develop on the record are immaterial. Indeed, much of the County's case consisted of demonstrating that many problems may arise during large-scale evacuations, a point that may well be conceded without shedding any light on whether NRC regulations are met. The regulations contemplate a plan by which trained personnel, exercising their considered judgment under whatever circumstances may be presented, use the personnel and resources at their disposal to deal with whatever contingencies may arise.

(footnote continued)

(Indian Point, Unit No. 2), LBP-83-68, 16 NRC 811, 970 (1983) (range of uncertainty is "considerable"). Likewise, there is no required minimum evacuation route capacity. Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), ALAB-732, 17 NRC 1076, 1109 (1983).

19/ Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), LBP-82-100, 16 NRC 1550, 1561 (1982), aff'd with modification, ALAB-732, 17 NRC 1076 (1983).

20/ Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit No. 1), ALAB-727, 17 NRC 760, 770 (1983).

See Tr. 17,727 (McIntire). In short, the watchword for an emergency plan is flexibility, not rigidity. Tr. 12,738-39 (McIntire), 9275 (Weismantle). And the adequacy of a plan is not determined by the number and variety of hearing room hypotheticals that intervenors can pose. Near the end of the hearing one NRC Staff witness, who has had a great deal of experience with emergency planning, testified as follows:

It is a fact that my colleague in Region I, who is a member of the RAC committee and reviewed the LERO plan for RAC, stated that this was the best offsite plan he had ever seen, and this is also my judgment. I have reviewed the offsite plans of all the plants that I am responsible for and this is the best and more [sic in transcript] comprehensive plan I have ever seen.

Tr. 15,226 (Sears). In light of such testimony, and the principles outlined above, it should not prove surprising that in this decision the Board spends little time on many issues that the Intervenor chose to raise, such as, for example, the design of the postcard used to identify disabled people; those sorts of details we leave to the planners themselves.

D. Human Behavior

17. Much of Suffolk County's case was founded on the vagaries of human behavior. For example, role conflict, shadow phenomenon, credibility, conflict of interest, training, and many other issues were founded on the bedrock assumption that people's behavior -- anxiety, disobedience, even panic -- may confound an emergency plan. Arguably these sorts of contentions ought not to be heard at all; NUREG-0654 takes into account human behavior, and following its guidelines minimizes the possibility of, for example, panic.^{21/} Moreover, the issues are generic ones.^{22/} Nevertheless, we have

^{21/} Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), ALAB-732, 17 NRC 1076, 1102 n.43 (1983). See also Pacific Gas & Elec. Co.

listened to the Intervenor's human behavior evidence in great detail, as have some other licensing boards who have been asked to decide similar issues. The Board finds below, however, that the vagaries of human behavior and the possibility of such things as panic, disobedience, and confusion do not make the LILCO Plan inadequate.

E. Participation of
the State and Local Governments

18. Suffolk County and New York State oppose LILCO's emergency plan and the operation of Shoreham, and they refuse to participate in emergency planning at present. There is substantial evidence, however, that in a real emergency these governments would respond and try to protect the public; for example, in a press release of December 20, 1983, the Governor of New York stated that "[o]f course, if the plant were to be operated and a misadventure were to occur, both the State and County would help to the extent possible; no one suggests otherwise." Cordaro et al., ff. Tr. 13,899, at

(footnote continued)

(Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 768 (1982) (the board assumed that responsible citizens would act intelligently on instructions given to general workers who would have some emergency duties); Public Service Co. of New Hampshire (Seabrook Station, Units 1 & 2), LBP-83-32A, 17 NRC 1170, 1177 (1983) ("shadow phenomenon" contention summarily disposed of); Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 779 (1982) (assuming "overreaction" by the public is likely, we have no remedy beyond that which is already planned, which is to broadcast accurate, consistent information).

22/ See Tr. 2169 (McIntire) (his testimony not specific to the LILCO Plan). Cf. Duke Power Co. (Catawba Nuclear Station, Units 1 & 2), ASLBP No. 81-463-01 OL, slip op. at 6 (Sept. 29, 1983) (board could learn nothing new by exploring generic issues of radioprotective drugs in the Catawba setting); Philadelphia Elec. Co. (Limerick Generating Station, Units 1 & 2), LBP-84-18, 19 NRC 1020, 1033 (1984).

7. There is no evidence to the contrary; throughout the months of hearings, no State or County witness ever testified that the State or County would not respond in a real emergency. How the State and County would respond, given their present opposition to LILCO's Plan, is not revealed by the record, because they have resisted addressing the issue.^{23/} But we must assume that they would respond in a responsible manner.

19. The Board has, throughout this proceeding, presumed that LILCO must carry the entire burden of emergency planning, and the decision below is based on that premise; that is, the Board does not rely on the presence of any State or County resources. However, the Board finds that in a real emergency State and local resources would be available. LILCO has designed its Plan to allow it to incorporate State and local resources at the time of the accident.^{24/} These facts, which are uncontested on this record, give added assurance that the public health and safety will be protected in the case of a radiological emergency.

F. Standards That Apply When State
and Local Governments Refuse to Participate

20. The Board and the parties have used NUREG-0654 as the standard for guidance in deciding the issues. However, the LILCO Transition

^{23/} The County's and State's latest word on this subject, in the form of affidavits filed after the hearings closed, suggests that the County's and State's position is that they will respond but in an incompetent fashion because they refuse to plan or to undergo training. See Opposition of Suffolk County and the State of New York to LILCO's Motion for Summary Disposition of Contentions 1-10 (the "Legal Authority" Issues) (Sept. 24, 1984). The Board addresses this bizarre notion in its separate decision as LILCO's motion for summary disposition of Contentions 1-10.

^{24/} See, e.g., Cordaro et al., ff. Tr. 13,899, at 8-9.

Plan is an "interim compensating action" under 10 C.F.R. § 50.47(c). As such, it is not required to give as much assurance as the ordinary governmental plan.^{25/} Moreover, one of the factors the Board may take into account is that any shortcomings in the plan caused solely by the governments' refusal to cooperate are beyond the applicant's control. See Consolidated Edison Co. (Indian Point), CLI-83-11, 17 NRC 731, 733 (May 5, 1983); CLI-82-38, 16 NRC 1698, 1703 (1982). This is immaterial in a sense, since the Board finds below that LILCO has met or exceeded the requirements of 10 C.F.R. § 50.47 and the guidelines of NUREG-0654.

III. THE GOVERNMENTAL INTERVENORS' STRATEGY IN THIS CASE

21. Suffolk County has argued strenuously throughout this proceeding that there are features "unique" to Long Island that make adequate emergency planning "impossible."^{26/} However, the County assiduously avoided presenting evidence about other locations and plans and consistently objected when LILCO attempted to present such evidence. See, e.g., Tr. 1342. The Board finds that no evidence has been presented to show that Long Island is

25/ Consolidated Edison Co. (Indian Point), CLI-83-16, 17 NRC 1006, 1010 (1983) (though interim compensating actions must be "adequate," they need not necessarily provide the same level of protection that complete correction of the deficiencies would offer); Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 & 3), LBP-82-39, 15 NRC 1163, 1174 (1982) (failure to meet one or more of the emergency planning standards does not necessarily result in a denial of an operating license); Pacific Gas & Elec. Co. (Diablo Canyon, Units 1 and 2), ALAB-644, 13 NRC 903, 937 (1981); Duke Power Co. (Catawba Nuclear Station, Units 1 & 2), LBP-84-37, 20 NRC ___, slip op. at 8 (Sept. 18, 1984).

26/ Several of the County's witnesses testified that an adequate plan is impossible. See, e.g., Tr. 10,881 (Olson), 10,877 (Saegert).

"uniquely" unsuited for emergency planning. See Cordaro et al., ff. Tr. 831, at 7-8. To the contrary, there is evidence that Long Island is an especially favorable location for an emergency plan in some respects and evidence that the LILCO Plan is superior to many other plans.

22. The County also founded much of its case on the alleged "uniqueness" of radiation, and many of its witnesses based their opinions that the LILCO Plan is inadequate on the "unique" nature of radiological emergencies, in particular (1) radiation as an unfamiliar and especially feared disaster agent, Tr. 10,794, 10,796-97 (Saegert); Dilworth, ff. Tr. 1213, at 4; Tr. 1266 (Dilworth), 1270 (Harris), 3112 (Muto), 3182 (Rossi), 1405 (Erikson), and (2) the swiftness with which radiological emergencies allegedly develop, Tr. 10,790-91, 10,793-94, 10,796, 10,951 (Olson), 10,797-98 (Purcell), 3105-06 (Smith), 3124 (Muto), 3181 (Rossi), 3095 (Petrilak), 1235, 1236, 1267 (Dilworth).^{27/}

23. The uniqueness of radiological accidents has been rejected by other boards.^{28/} Moreover, the County's position is a challenge to the NRC regulations, since it challenges the basic premise of the regulations that planning for radiological emergencies is feasible and useful. As a related matter, the Board finds, as have other boards, that experience and data from nonradiological disasters such as floods and hurricanes are relevant to radiological emergency planning.

^{27/} On the other hand, when queried about how long one would have to respond, County witnesses typically pled ignorance. Tr. 1283 (Dilworth), 3095 (Petrilak), 10,796 (Olson); see also Tr. 3106 (Smith), 3124 (Muto).

^{28/} Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 823, 825 ¶ 187 (1982); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1563 (1981).

24. The County, and even more so the State, chose not to present as witnesses people in their employ who might have shed light on the issues.^{29/} Those witnesses who had been involved in earlier County or State planning displayed poor memories. See, e.g., Tr. 1230, 1280 (Dilworth), 7884 (Knighton, Albertin), 7885 (Acquario), 7892 (Knighton). This has the legal effect of raising inferences contrary to the State's and County's positions. See Public Service Co. of New Hampshire (Seabrook Station, Units 1 & 2), ALAB-471, 7 NRC 477, 478, rev'd as to other matters, CLI-78-14, 7 NRC 952 (1978) (when a party has relevant evidence within his control that he fails to produce, that failure gives rise to an inference that the evidence is unfavorable to him).

25. As indicated above, this has been a long and complex case, with many issues and witnesses. It is relevant to an assessment of Suffolk County's evidence that the County's position has not been entirely coherent; it has sometimes taken inconsistent positions from one issue to another. This is revealing of nothing so much as the County's commitment to prevent the operation of Shoreham, no matter what the facts. For example, the County has urged the Board to find that fear of radiation will cause people to panic and act contrary to emergency information. On the other hand, the County has testified that LILCO's mobilization efforts will be confounded by members of the public going on shopping trips after they are notified of the emergency. This and other inconsistencies in the Intervenor's case are noted below.

^{29/} Most notably, Suffolk County presented no witnesses from its Department of Emergency Preparedness, its "lead agency" for emergency planning. Tr. 9784 (Mayer). Many of the County's witnesses had never reviewed any radiological emergency plan except LILCO's. Tr. 10,882 (Olson), 10,882 (Lipsky).

THE CONTENTIONS

26. The first two sections below, I and II, address issues of human behavior. In general, the Board finds LILCO's expert witnesses to be more credible than the County's on behavioral issues because (1) other NRC licensing boards have accepted their views,^{30/} (2) they were consistent with FEMA and NRC Staff witnesses, (3) they were experienced in studying human response to emergencies, and (4) their views were based more solidly than the County's on empirical, scientific evidence, as found in the scientific literature.

I. HUMAN BEHAVIOR

A. Shadow Phenomenon (23.A, B, C)

27. In Contention 23, the intervenors contend that "shadow phenomenon" or "overreaction," that is, people evacuating in an emergency when they have not been advised to do so, will cause traffic congestion and confusion and therefore make timely evacuation of the EPZ impossible. For the reasons stated below, we find that the intervenors' assertions regarding "shadow phenomenon" during an emergency at Shoreham are without merit.

30/ Dr. Mileti has been relied on by other licensing boards. Kansas Gas & Elec. Co. (Wolf Creek Generating Station, Unit No. 1), ASLB-81-453-03 OL, 20 NRC ___, slip op. at 23 (July 2, 1984); Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), ALAB-781, 20 NRC ___, slip op. at 29 (Sept. 6, 1984). Dr. Dynes' views were upheld over Dr. Erikson's in Indian Point. Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 955-60 (1983). Mr. McIntire of FEMA said that Dr. Dynes and Dr. Quarantelli were codirectors of the Disaster Research Center when it was the main, and maybe almost the only, institution that had an active ongoing disaster research program. Tr. 2150-51, 2168 (McIntire).

Shadow Phenomenon and Panic

28. "Shadow phenomenon" or "overreaction" is a familiar concept in the social sciences. Cordaro et al., ff. Tr. 1470, at 8; Ziegler and Johnson, ff. Tr. 2789, at 8. It is one extreme tail of a distribution of responses to emergencies ranging from underresponse (people refusing to leave an unsafe area when advised to do so) to overresponse (people leaving a safe area when not advised to do so). The Intervenor has used the term "shadow phenomenon" in this proceeding, but it is not a widely-used or clearly-defined term in emergency planning, Urbanik, ff. Tr. 3430, at 8, in part because it is considered by social scientists to be a "nonproblem" in emergencies. Tr. 2006-08 (Sorenson). For convenience, we will use the terms "overreaction," "shadow phenomenon," and "overresponse" interchangeably in these findings.

29. Overresponse has been observed in various kinds of emergencies studied by social scientists, including radiological emergencies. Cordaro et al., ff. Tr. 1470, at 17-18; see Tr. 2011-12 (Mileti). The LILCO and County witnesses agree that response in an emergency, including overresponse, depends upon perceptions of risk during the emergency, Cordaro et al., ff. Tr. 1470, at 17-18; Ziegler and Johnson, ff. Tr. 2789, at 5; Tr. 2017-19 (Mileti), 3915 (Cole), but the witnesses differ as to what influences perceptions of risk. The County asserts that those perceptions of risk are governed primarily by pre-emergency fears, Cole and Tyree, ff. Tr. 3907, at 3; Mileti and Sorenson, ff. Tr. 3940, at 6-7; Tr. 2893 (J. Johnson), while LILCO contends that emergency information primarily influences perceptions of risk. Mileti and Sorenson, ff. Tr. 3940, at 4; Tr. 2012 (Mileti). These conflicting views are discussed further below.

30. The witnesses also agree that shadow phenomenon is not panic or hysteria. Shadow phenomenon represents rational, reasonable behavior consistent with the perceptions of risk that some people may hold during an emergency. Cordaro et al., ff. Tr. 1470, at 11-14; Ziegler and Johnson, ff. Tr. 2789, at 5. It is generally acknowledged that mass panic in emergencies is rare. See Tr. 10,764, 10,767-68, 10,772, 10,780, 10,812 (Saegert). Panic, hysteria, and other irrational behavior are characterized by a loss of control or rationality, and can occur only where (1) an individual perceives that there is a specific threat to his physical survival and as a result becomes fearful of his survival, (2) there appear to be escape routes available that would offer safety, and (3) those escape routes appear to be closing so that they cannot be traversed. Cordaro et al., ff. Tr. 1470, at 14-15; McIntire, ff. Tr. 2086, at 7. These three conditions would not exist in an evacuation from the areas around a nuclear power plant such as Shoreham, because people would be leaving an open geographic area (rather than, for example, a closed building), and their escape routes would not be blocked. Cordaro et al., ff. Tr. 1470, at 16; McIntire, ff. Tr. 2086, at 7.

How People Respond in an Emergency

31. Human behavior in emergencies has been studied in a wide variety of contexts, Cordaro et al., ff. Tr. 1470, at 20-21, and the response to an emergency is not well represented by a simple stimulus-response model of human behavior, id. at 21. The Intervenor contends that due to pre-emergency fear of radiation, many people would overreact in an emergency at Shoreham, creating a "shadow" that would impede evacuation of the EPZ. On behalf of LILCO, Dr. Dennis Mileti, a sociologist who has studied emergency

behavior at various emergencies, presented a detailed analysis describing the decision-making process for response to emergencies, see id. at 21-25, containing six steps, each of which can be affected by ten "sender factors" (characteristics of the information disseminated) and six "receiver factors" (characteristics of the person hearing the information). See Cordaro et al., ff. Tr. 1470, at 26-35, 36-41. He concludes from this analysis that the source, consistency, accuracy, clarity, certainty, frequency, and specificity of emergency information given at the time of the emergency, and not pre-emergency fears, will result in people coming to believe official information more than rumors and prior perceptions, and therefore will reduce overresponse in an emergency, including a nuclear power plant emergency. Cordaro et al., ff. Tr. 1470, at 45. He also concludes that the EBS messages for Shoreham, which he helped to draft and has reviewed extensively, address these complex factors. Tr. 2069 (Mileti). Dr. John Sorensen, a social scientist at the Oak Ridge Laboratory, who also appeared on behalf of LILCO, also has reviewed EBS messages from a number of nuclear power plants across the country, including Shoreham. Tr. 1481-85 (Sorensen).

32. In addition to the EBS messages, the LILCO Transition Plan incorporates an emergency news center (ENC) as a single focal point for all information disseminated to the public during an emergency, a public information brochure distributed annually describing what people should do in an emergency, and annual briefings for news media to ensure that they have passing familiarity with emergency plans and know who to contact for public information during an emergency, all consistent with NUREG-0654 criteria. Cordaro et al., ff. Tr. 1470, at 50-52; Tr. 2001 (Weismantle); see McIntire ff. Tr. 2086, at 3.

33. While the Intervenor's argue that radiological disasters are unique, Ziegler and Johnson, ff. Tr. 2789, at 23-25; see Tr. 2289-90 (Saegert), Dr. Mileti points out that all hazards have similarities and dissimilarities with others and in that sense every hazard is unique, Cordaro et al., ff. Tr. 1470, at 113-14. The unique features of a particular emergency do not make a significant difference in the kind or amount of overreaction that can be expected from the public, because if emergency public information is good, overresponse in an emergency, including a radiological emergency, will be minimized. Cordaro et al., ff. Tr. 1470, at 114-15. An analysis by Dr. Sorensen regarding the effects of various factors on emergency response at TMI confirms this conclusion. Tr. 2050-52 (Sorensen); see SC Ex.3.31/

34. We find that NUREG-0654 presumes that citizens will act reasonably on the information that is provided to them. Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-82-70, 16 NRC 756, 780 (1982). Even if one assumes that overreaction is likely, the remedy is to broadcast accurate, consistent information, see id. at 779, which LILCO is planning to do. The LILCO Plan complies with the guidance provided in

31/ The testimony offered by County witnesses in rebuttal to this study, see Cole and Tyree, ff. Tr. 3907, at 1-23, does not change this conclusion. The County's analysis of Dr. Sorensen's path model analysis does not further their contention that pre-emergency fear of radiation determines behavior in an emergency, because (1) it merely examined one set of data available on evacuation behavior at TMI, Mileti and Sorensen, ff. Tr. 3940, at 4-5, (2) it concludes, as LILCO contends, that fear of radiation at the time of an accident (situational perception of risk) is important in determining behavior, id. at 6, and (3) it ignores the large number of studies of evacuation behavior in various emergencies that conclude that emergency information is the key factor in evacuation response, id. at 4. Also, Dr. Tyree testified that about 60% of the variation in evacuation behavior was not explained by the variables in the model at all. Tr. 3912 (Tyree).

NUREG-0654, and therefore LILCO has done what can be done to ensure an orderly, safe evacuation that minimizes overresponse. "No additional measures need be taken to cope with the public anxiety." Louisiana Power & Light Co. (Waterford Steam Electric Station, Unit 3), LEP-82-100, 16 NRC 1550, 1562 (1982). We conclude that, if a "shadow effect" occurs in the event of an emergency response at Shoreham, it will be minimal, due to the public information provided under the LILCO Plan.

Three Mile Island

35. The intervenors point to the response at Three Mile Island in support of the theory that a "shadow phenomenon" will occur in a radiological emergency. They assert that 141,500 more people evacuated than were advised to, due to pre-emergency fear of radiation, proving that many more people than those advised to evacuate in an emergency at Shoreham will do so. Ziegler and Johnson, ff. Tr. 2789, at 8; Tr. 2893 (J. Johnson); see Tr. 3915-16 (Cole). While the LILCO witnesses agree that pre-emergency fear of any kind (including fear of radiation) helps shape how people use information and perceive the threat of an accident, Cordaro et al., ff. Tr. 1470, at 60-61, they contend that pre-emergency fear does not directly cause evacuation. Cordaro et al., ff. Tr. 1470, at 61. Dr. Mileti points out that TMI was an "information disaster," because emergency information given out was grossly inconsistent, inaccurate, uncertain, insufficient in detail, and incomplete, resulting in perceptions of risk for the people that were largely inconsistent with the objective risks that actually existed. Cordaro et al., ff. Tr. 1470, at 52-59; see McIntire, ff. Tr. 2086, at 3, Ziegler and Johnson, ff. Tr. 2789, at 37-38. Dr. Mileti concludes that at Shoreham, public information would

certainly be better than that at Three Mile Island, resulting in a public response that would most likely match advisories given. In addition, the TMI study performed by County witnesses Zeigler and Johnson and relied upon by the County never inquired into pre-emergency response, Tr. 2890-91 (Johnson), and their survey concluded that 70% of the evacuees cited conflicting information as a reason they evacuated, Tr. 2885 (J. Johnson).

36. We agree with LILCO that the TMI response does not necessarily mean that overresponse of that magnitude will occur in any radiological emergency, or that data from TMI can be used to predict emergency behavior within and without the Shoreham EPZ. As was pointed out by sociologist Dr. Russell Dynes, who was a member of the President's Commission on Three Mile Island, advisories during the TMI accident went out for varying areas from the plant, covering at different times 5 miles, 10 miles, and 20 miles. This record belies the notion that there was a 10-mile EPZ, or any well-defined EPZ, during the accident response at TMI; the lack of a defined area of risk at the time of the emergency tends to confound attempts to determine in retrospect whether persons evacuated who were not advised to do so. Tr. 1994-99 (Dynes). In addition, the conflicting information about a hydrogen bubble, the severity of the accident, and the appropriate response to it, was not the sort of information that would create accurate risk perceptions and therefore minimize overreaction. Cordaro et al., ff. Tr. 1470, at 52-59. As to the notion that overresponse of the magnitude at TMI is a foregone conclusion for any nuclear accident and therefore that the LILCO Plan cannot be adequate as a result, we note (1) that a successful public information program at a nuclear power plant since TMI, during the Ginna incident in

January of 1982, with a result of no overreaction, and (2) that a revised emergency plan for the area around TMI, where the alleged overreaction originally occurred, has been approved by the NRC, based upon the improved public information efforts in the plan, Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1569 (1981). We decline to predict, based on the TMI experience, that a large "shadow effect" would occur during an emergency at Shoreham, making evacuation impossible. To do otherwise, in our view, would be contrary to the planning criteria of NUREG-0654, which is premised on the proposition that public overreaction to a nuclear accident is likely to be minimized if its guidance is followed. Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), LBP-82-100, 16 NRC 1550, 1562 (1982).

Using Polls to Predict Response

37. While LILCO and the Intervenor agree that some overreaction could occur in an accident at Shoreham, Cordaro et al., ff. Tr. 1470, at 66; Ziegler and Johnson, ff. Tr. 2789, at 5-6, they do not agree on the extent of the overresponse that can be expected. The LILCO witnesses assert that it is not possible to predict the precise amount of overreaction, if any, that could be expected in an emergency at Shoreham or anywhere else, because the overresponse would be a direct consequence of what went on at the time of the accident, particularly the emergency information given, Cordaro et al., ff. Tr. 1470, at 66-67; Dr. Mileti determined that in no event would he expect to see a "shadow" of more than 20 to 25% in an emergency at Shoreham, Tr. 2012, 2061 (Mileti), given the emergency information program for Shoreham, Tr. 2069 (Mileti). In contrast, the County introduced various analyses of

four polls, three taken in Suffolk County and one taken at Three Mile Island, to support the proposition that one can predict from polls the magnitude of a "shadow" that would occur during an emergency at Shoreham. See Cole ff. Tr. 2792, at 3-5; Ziegler and Johnson, ff. Tr. 2789, at 19-23; Cole and Tyree, ff. Tr. 3907, at 1-23; Tr. 2826 (Cole). The results of these polls indicate a shadow of as much as 50% of the people will attempt to evacuate during a radiological emergency at Shoreham, even when advised not to do so. Cole, ff. Tr. 2792, at 14; Saegert, ff. Tr. 2259, at 7; Tr. 2822 (Cole). In addition, LILCO introduced two polls to illustrate the proposition that different polls will produce different responses depending upon the wording of the questions, rebutting the conclusions being drawn by the County as to the volume of overreaction to be expected. See Cordaro et al., ff. Tr. 1470, at 99, 103, 99-111. We conclude for the following reasons that one cannot predict an overresponse in an emergency based upon the results of public opinion polls.

38. First, as explained by County witness Dr. Stephen Cole, a professor at Stony Brook University and head of the firm that conducted three of the polls relied upon by the County, "there are frequently discrepancies between what opinion surveys show and the final outcome" of the action predicted. Tr. 2798 (Cole). In the case of the poll he was being questioned about, a poll in which he incorrectly predicted the percentage of votes a candidate would receive, Dr. Cole indicated that such discrepancies between opinion surveys and final outcomes do not necessarily indicate that the survey is "wrong," explaining

There are other reasons why there can be differences between results indicated by an election poll conducted a 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. County witnesses suggest that polls of the sort that have been taken on Long Island and introduced into evidence in this proceeding should be repeated "if there is reason . . . to believe that there may have been some change in the attitudes, perceptions, and behavioral intentions of the populations," Tr. 2862 (Cole, Zeigler), although these witnesses do not explain how one would determine whether "behavioral intentions" had changed sufficiently to warrant a new survey being taken. We conclude that, given the vagaries of predicting action on the basis of responses to polls, and the complex factors that enter into a decision during an emergency about what action to take, polls are virtually useless in predicting whether overreaction will occur at an accident at a nuclear power plant, or to what extent people will overreact.

39. Even if we were to conclude, as we have not, that polls could be useful in predicting response, each of the polls presented by the parties in this proceeding has been criticized by various of the polling experts on methodological grounds, including (most frequently) that the questions in the various polls are biased toward one answer or another, depending upon who was the proponent of the poll, see, e.g., Tr. 1926-29 (W. Johnson, Mileti), 1935 (Richardson), 2053-58 (Cordaro), 2058-59 (Mileti), 2832-34 (Cole); that the pre-testing of the surveys was questionable, see, e.g., Tr. 1926 (W. Johnson), 2817 (Cole); that the questions were unclear and open to varying interpretations by respondents, see, e.g., Tr. 1931 (W. Johnson), 2808-14 (Cole); that analyses of data were not rigorously completed, see, e.g., Tr. 1947-49 (Richardson); that completion rates for the polls were low, casting doubt on the validity of the results, see, e.g., Tr. 1912-17 (Richardson); that sampling procedures violated random selection principles, see, e.g., Cordaro et al., ff. Tr. 1470, at 97-98; Tr. 2838-39 (Cole); that bias was created by the tones of the persons administering the questions by telephone, see, e.g., Tr. 2801 (Cole); that publicity at the time the poll was taken influenced responses, see Tr. 2818 (Cole); and so forth. See also Tr. 9725 (Barnett). These various criticisms, which left no poll introduced in this proceeding untouched, further point out the perils that await those who attempt to use public opinion polls to predict emergency response.

Specific Findings as to Subparts A, B, and C

40. In Contention 23.A, the Intervenor's contend that the "shadow phenomenon" will result in a number of people choosing to evacuate when they are advised to shelter, and therefore that the LILCO Plan does not comply

with 10 C.F.R. §§ 50.47(a)(1) and (b)(1), and NUREG-0654 Sections J.9 and J.10. As discussed above, we conclude that the public emergency information system for Shoreham is designed to encourage people not to evacuate when sheltering is appropriate, thereby minimizing overresponse. LILCO has done all it can through its emergency plan to encourage people to follow protective action recommendations; it is not required to be a guarantor that each person in the emergency planning zone will follow those recommendations once given.

41. In Contention 23.B, the Intervenor contend that the "shadow phenomenon" will result in people evacuating when they are told that they need not take any protective action, and therefore that they will be unable to shelter if the emergency escalates and a sheltering recommendation is made. Contrary to Contention 23.B, we conclude that it is unlikely that "a substantial portion of the population, upon learning of the existence of an emergency at Shoreham, will decide to evacuate" upon being advised that they need take no action in response to an incident at the plant. Studies of emergency behavior indicate that the first response to an announcement of an emergency at Shoreham will be to seek more information,^{32/} not to leave the area. Cordaro *et al.*, ff. Tr. 1470, at 120; *see* Tr. 2019-20 (Mileti).

42. In Contention 23.C, the Intervenor contend that people in an area where evacuation has not been recommended will evacuate anyway upon seeing their neighbors evacuating. As explained in more detail below in Section IX.A, the Intervenor erroneously premise their contention on the

^{32/} At least one County witness believes that people seek information at the time of an emergency. *See* Tr. 2276-77 (McGuire) ("it has been my experience that when people are subjected to public education, they don't pay attention until it's time to use the information").

assertion that inner EPZ zones are to be evacuated zone-by-zone. In addition, the sound emergency information to be provided under the LILCO Plan during an emergency will allow people to identify whether an evacuation advisory pertains to them, and respond accordingly.

B. Role Conflict (25)

43. Contention 25 is about "role conflict." This refers to Suffolk County's thesis that emergency workers and others will let concern for their families interfere with their performance of emergency duties. Role "abandonment" is abandoning one's emergency job in favor of seeing to one's family. Cordaro et al., ff. Tr. 831, at 16.

44. The Board's basic finding is that emergency workers who have a clear understanding of their roles in an emergency plan do not abandon those roles in time of emergency. This finding is based on a large body of empirical research, particularly studies done at the Disaster Research Center in which over 6000 interviews with emergency workers uncovered not a single example of emergency role abandonment. Cordaro et al., ff. Tr. 831, at 16-17, 69-71; Tr. 1012-53, 1150-52, 1162-64 (Mileti, Dynes). It is consistent with the over 15 years' experience of the FEMA witness. McIntire, ff. Tr. 2086, at 3; Tr. 2101 (McIntire). It is also consistent with NRC case law.^{33/}

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

^{33/} Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 958-60 (1983); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1489 (1983); Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 767-68 (1982).

seen it happen, no one has heard of it happening,^{34/} 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 (Petrilak), 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.

46. There is no dispute that emergency workers may experience anxiety while they are separated from their families. And they may engage in on-the-job checking to see that their families are safe (as by a phone call), Tr. 1035 (Dynes), leave the job temporarily at a time when they are not essential to the group effort, Tr. 1034 (Dynes), or make arrangements for their families before they report to work, see Tr. 1048 (Dynes). But they also perform their emergency jobs.^{35/} Cordaro et al., ff. Tr. 831, at 24; Tr.

^{34/} This is not to say that there are no cases at all of individuals leaving their jobs. But a plan is primarily composed of the actions of organizations, not individual persons. Cordaro et al., ff. Tr. 831, at 87; Tr. 1111 (Dynes). Typically the organization has the flexibility to adjust to the absence of a few individuals. The findings here focus on the ability of organizations such as LERO to respond to an emergency, and apparently no witness knew of an organizational failure caused by "role conflict."

^{35/} Accord, Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 768, 808 ¶ 69 (1982) ("most responsible workers would resolve their conflicts in a common-sense fashion by seeing to their families' safety and then reporting for duty").

1119 (Mileti). This picture of emergency behavior is consistent with experiences recounted by the County's witnesses. Tr. 3111 (Smith), 3136 (Rossi), 3185-86 (Jeffers).

47. LILCO's witnesses performed a literature review on role conflict. Cordaro et al., ff. Tr. 831, at 51-71; Tr. 1133-34 (Sorensen). They testified that some researchers have concluded that people in emergencies abandon their emergency roles. But what these writers have actually seen is people without clear emergency roles going home to their families. See Tr. 922-24 (Mileti). More recent work has revealed that a clear definition of one's emergency role keeps one from abandoning that role when the emergency happens. Tr. 1150 (Mileti), 1169 (Dynes). This role definition can be had by various means, such as training. Tr. 1136, 1146 (Mileti), 2154-55, 2157-58 (McIntire); Cordaro et al., ff. Tr. 831, at 32-33. Organization is also important. See Tr. 2155, 2157-58, 2159-60 (McIntire). In an emergency, people's values shift to place importance on protecting threatened people, and this simplifies role strain. Cordaro et al., ff. Tr. 831, at 18-20. The essential point is that phenomena such as role conflict are reasons why emergency planning is done in the first place, not factors that make emergency planning unworkable. See Cordaro et al., ff. Tr. 831, at 62-64; Tr. 1136, 1146 (Mileti).

48. Dr. Kai Erikson testified for Suffolk County that role conflict could be a problem. However, he knew of no empirical evidence about role abandonment by people who had roles in an established emergency plan. Tr. 1399-1400 (Erikson). Dr. Erikson is an eminent sociologist and has been found "credible" by at least one board;^{36/} however, his views have been

36/ Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 958 (1983). Here "credible" appears to mean eminent, intelligent, articulate, and

consistently rejected.^{37/} Dr. Erikson has never done field work on a communitywide disaster near the time of its happening, Tr. 1326, 1340 (Erikson), and the disaster with which he is most familiar, the Buffalo Creek flood, does not provide support for the "role conflict" hypothesis.^{38/} Cordaro et al., ff. Tr. 831, at 45-46; Tr. 2176 (McIntire). He has encountered a total of three radiological emergency plans, all of which he judged inadequate because of "role conflict," though he cannot articulate standards for when a plan is adequate. Tr. 1344, 1346, 1349-50 (Erikson).

49. Dr. James Johnson also testified for the County. He based his views on studies he believed found that doctors evacuated at TMI at the same rate as the general population, Tr. 1383-84, 1417 (J. Johnson), and on

(footnote continued)

sincere. But at the same time, Dr. Erikson's theory is contradicted by the overwhelming weight of the evidence, including the weight of evidence from radiological disasters such as TMI and Ginna. Also, one board found reason to question the standards used by Dr. Erikson in judging studies.

Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1565 (1981).

37/ See Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 958 (1983); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1489 ¶ 1423 (1981); Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 768 (1982); see also Detroit Edison Co. (Enrico Fermi Atomic Power Plant, Unit 2), DD-84-11, 19 NRC 1108, 1118 (1984).

38/ Although Dr. Erikson's book about Buffalo Creek won three awards and is widely read in beginning sociology classes, Tr. 1404 (Erikson, J. Johnson), there is reason to doubt its value as scientific inquiry. The study was done a year after the flood, Tr. 1311 (Erikson), and there is reason to suspect that the subjects of the study were influenced by the fact that Dr. Erikson was working for the law firm that was trying to recover damages for them. Tr. 1311-12, 1314-23 (Erikson). The book contains disclaimers about its lack of adherence to customary scientific standards. Tr. 1318-19 (Erikson).

studies showing that people fear radiation, Tr. 1385-86, 1418-19 (J. Johnson). But there is no evidence the doctors had roles in any TMI-related emergency plan, see Finding 54; the study on fear of radiation that he cited in his written testimony was not generalizable to the public at large, Tr. 1382, 1387 (J. Johnson); and, in any event, the notion that radiation is "unique" for emergency planning purposes is not well founded. Cordaro et al., ff. Tr. 831, at 93-98; Tr. 1161 (Mileti).

50. The other County witnesses^{39/} on role conflict (Dilworth, Harris, Cole) had limited experience with widescale disasters. Tr. 1235-36, 1246-48 (Dilworth); Tr. 3909 (Cole). Dr. Harris's basis for testifying on "role conflict" was primarily a series of phone calls made by his staff to various health care institutions. Tr. 1250-53 (Harris).

51. On the other hand, LILCO's witnesses Dynes, Mileti, and Sorensen had extensive familiarity with human response to emergencies and emergency planning. Cordaro et al., ff. Tr. 831, Att. 2, 4, 5; Tr. 849-50, 875-76, 907, 1150 (Dynes), 1133-34 (Sorensen). So had the FEMA witness. Tr. 2164-65 (McIntire).

52. The County witnesses' resort to the scientific literature on disaster behavior was not probative of their views. In many cases it was not clear whether the studies they cited were referring to people who had defined roles in emergency organizations. Erikson and Johnson, ff. Tr. 1455, at 14, 15,

^{39/} New York did not present witnesses on this issue. In the Indian Point proceeding, however, New York witnesses reportedly testified that professional emergency workers do not forsake their duties. Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 959 (1983) (citing Davidoff/Czech).

17, 18; Tr. 1335-36 (Erikson), 993 (Mileti). In some cases quotations were taken out of context. Tr. 1327-28, 1332-33, 1338-39 (Erikson). In some cases the witness did not know much about the qualifications of the authors. Tr. 1337, 1339, 1340 (Erikson). Most important, neither the witnesses nor some of the authors they cited appeared to have taken into account more recent work that LILCO's witnesses regarded as more enlightened. Tr. 1395-96, 1398 (J. Johnson). Specifically, the County's witnesses were unaware of the DRC study until shortly before the hearing, Tr. 1394, 1398 (J. Johnson), 1395 (Erikson), notwithstanding that it had been circularized and presented at meetings, Tr. 1162 (Dynes), and notwithstanding that written testimony about it had been filed by LILCO in Phase I, over a year before the County witnesses testified.^{40/}

53. The County relied heavily on opinion surveys, particularly a survey of school bus drivers performed in September 1982. Cole, ff. Tr. 1216, at 2-10; Erikson and Johnson, ff. Tr. 1455, at 24-27. As the Board has found in its findings on "shadow phenomenon," above, opinion surveys are not a reliable indicator of what people's actual behavior will be in an emergency. Cordaro et al., ff. Tr. 831, at 85-88; Tr. 1121-22, 1164-66 (Mileti); see also Tr. 2798-99 (Cole).^{41/} Also, the survey was flawed methodologically. Cordaro et al., ff. Tr. 831, at 89, 91-92.

40/ Testimony of Matthew C. Cordaro et al. . . . on . . . Role Conflict, at 809 (Oct. 12, 1982).

41/ Accord, See also Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 805 ¶ 46 (1982); see also Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 958 (1983) (testimony of Dr. Sidney Lecker).

54. The County throughout this proceeding has tended to discount the value of experience from nonradiological disasters and to emphasize Three Mile Island. But the TMI experience does not support the County's theory of role conflict. Dr. Mileti's informal investigations suggested that role abandonment had not been a major problem at TMI. Cordaro et al., ff. Tr. 831, at 73-76. There were some reports that hospital personnel did not show up for work during the course of the accident. Tr. 1056-57 (Dynes). But Dr. Mileti's research assistant called the authors and found that the people who had left did so because they had no emergency role. Cordaro et al., ff. Tr. 831, at 72-78, 80-85. 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).

55. A subsequent radiological emergency at Ginna did not reveal instances of role abandonment by emergency workers. Cordaro et al., ff. Tr. 831, at 93, Att. 8; Tr. 1166-67 (Weismantle, Cordaro); see Tr. 2170-71 (McIntire).^{42/}

56. Occasionally in the hearings the issue of fear for one's family (role conflict) got confused with the issue of fear for one's own safety. The contentions raise this issue only with respect to LILCO employees (Contention 25.A). The idea that emergency workers will refuse to do their jobs out of

^{42/} Cf. 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).

fear for their own safety is not supported by the evidence. Cordaro et al., ff. Tr. 831, at 98-106; McIntire, ff. Tr. 2086, at 4.^{43/} Again, emergency plans can take measures to prevent this; in the LILCO Plan, for example, workers expected to enter the EPZ are trained and provided personal dosimeters. Tr. 1187-88 (Cordaro).

LILCO Employees

57. There is no evidence that LILCO employees in LERO, any more than other emergency workers, would abandon their roles. Many are also volunteer firemen and the like, Tr. 1125, 1472 (Weismantle), and they are familiar with the demands of emergency restoration of electric power. Cordaro et al., ff. Tr. 831, at 17-18, 105, Tr. 864-66 (Cordaro).

58. The LILCO employees are trained, and the training, plus detailed procedures and a family brochure, make their roles clear. Cordaro et al., ff. Tr. 831, at 18, 32-33; Tr. 1157-58 (Weismantle). They have the benefit of the Family Tracking System, 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 knew, no other plan has such a feature, Tr. 900 (Weismantle), 2155-56 (McIntire). The LERO members will have access to information about the emergency, LILCO Ex. 3; Cordaro et al., ff. Tr. 831, at 21-22; Tr. 892-94 (Weismantle, Cordaro), and their families^{44/} have a special relocation center. Cordaro et al., ff. Tr.

^{43/} Accord, Virginia Elec. & Power Co. (North Anna Nuclear Power Station, Units 1 & 2), LBP-77-68, 6 NRC 1127, 1158 (1977), aff'd, ALAB-491, 8 NRC 245 (1978).

^{44/} The plan is to advise outside groups, as well as LERO workers, about the tracking system and special relocation center. Tr. 905 (Weismantle).

831, at 21; Tr. 902-04 (Weismantle).

59. The FEMA witness testified that role conflict for LILCO employees would not be a serious problem because they would tend to make preparations for their families. Tr. 2145 (McIntire); see also McIntire, ff. Tr. 2086, at 4. Dr. Erikson also emphasized the importance of family "contingency plans," though he apparently felt that only policemen and other "professionals" have them. Tr. 1375, 1407 (Erikson). But LERO employees are specifically advised to make family plans. Cordaro et al., ff. Tr. 831, at 20-21; Tr. 885 (Weismantle); see also Cordaro et al., ff. Tr. 831, at 20-21; Tr. 886-87 (Dynes), 887-88 (Mileti).

60. At the time of hearing only 73 of 1585 LILCO emergency workers lived in the 10-mile EPZ and therefore might be expected to have families at risk. Cordaro et al., ff. Tr. 831, at 15; Tr. 861 (Weismantle). Even if some of them did not show up for work, there is a surplus of workers that could be drawn on. Cordaro et al., ff. Tr. 831, at 28; Tr. 927-28, 934, 1179-81 (Weismantle). Moreover, LILCO plans to offer basic radiological training to the bus drivers who work for the companies that will supply LERO with buses; these drivers are another potential source of personnel, on an ad hoc basis, to implement an evacuation. Cordaro et al., ff. Tr. 831, at 35; Tr. 6390-95, 6401-02, 6410-11 (Robinson, Weismantle).

61. Mr. Dilworth's testimony for the County was based on his experience with police officers, Tr. 1262-63 (Dilworth), but he applied it primarily to LILCO employees, Tr. 1242 (Dilworth), with whom he had little or no experience, Tr. 1245-46 (Dilworth). Moreover, his experience with the police department was that the police had never failed to respond because of role

conflict. Tr. 1237, 1239, 1268, 1283 (Dilworth). Nor could he give an example of any emergency organization that had not responded. Tr. 1243 (Dilworth). In light of this, his unsupported opinion that LILCO employees would suffer role conflict is entitled to no weight whatsoever.

Department of Energy

62. There is no evidence that DOE RAP Team members, any more than other emergency workers, would abandon their jobs. They are trained and experienced. Tr. 956-57 (Cordaro, Weismantle), 1174 (Weismantle). They are familiar with radiation, and their role is defined under a federal program and set forth in the LILCO Plan. Cordaro et al., ff. Tr. 831, at 34. The FEMA witness testified that role conflict with Brookhaven National Lab personnel is expected to be "almost nonexistent." McIntire, ff. Tr. 2086, at 5; see also Tr. 2138-40 (McIntire). The County presented no reliable evidence on the behavior of DOE personnel; Mr. Dilworth had no experience with DOE personnel and did not know what their function would be. Tr. 1242 (Dilworth).

School Bus Drivers

63. Suffolk County's evidence on the role conflict of school bus drivers was a survey commissioned by the County in which 3% of the school bus drivers queried said they would immediately leave the evacuation zone, 24% said they would first report to work, 69% said they would first make sure that their families were safely out of the evacuation zone, and 4% said that they would first check on their families and then report to work. Cole, ff. Tr. 1216, at 2-12; Cordaro et al., ff. Tr. 831, at 34-35. As the Board has found above, opinion surveys are not a reliable way of predicting what people will

do in a real emergency. Moreover, since "making sure that one's family is safely out of the evacuation zone" may be accomplished by a phone call in some instances, even accepting the results of the County's poll at face value does not show the likelihood of a massive defection of school bus drivers. Cordaro et al., ff. Tr. 831, at 35.

64. Apparently the school administrators who testified for the County had never encountered teachers or bus drivers abandoning the school children. See Tr. 3167 (Smith), 3130, 3133, 3167-68 (Rossi), 3138, 3169, 3185-86 (Jeffers). About the closest they came to recalling an example was a single case of a bus driver who tended her own child first after an accident. Tr. 3166 (Smith).

65. The FEMA witness 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 will 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).

66. Though there seems to be no reason to be concerned about role conflict for trained emergency workers, some licensing boards have been concerned about laypersons who may have tasks to perform in a radiological emergency. The conclusion has been that the problem of role conflict can be solved by planning. See, e.g., Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 959 (1983). This is what Shoreham-Wading River is doing. Doremus, ff. Tr. 9491, at 9. It does not represent an

"insurmountable difficulty." The schools have already in some cases polled their bus drivers and teachers. They have early dismissal plans already for snow and other types of emergencies. With relatively little effort they can plan to avoid problems of "role conflict."

Teachers, Other School Employees,
and Crossing Guards

67. Several school districts have passed resolutions indicating that they do not think the LILCO Transition Plan is adequate and that they oppose the operation of Shoreham. These resolutions assert that role conflict would be a problem in an emergency at Shoreham. Cordaro et al., Tr. 5/30/84 Vol. 11, Att. 18-20. On the other hand, representatives of the teachers in the Shoreham-Wading River district, the one closest to the plant, have said emphatically that they would not abandon their students. Doremus, ff. Tr. 9491, Att. 4.

68. By and large, the school boards that oppose Shoreham have taken their position after limited inquiry and without hearing from LILCO. See, e.g., Tr. 11,038 (Jeffers). Nor did they make their decisions based on NRC regulations, with which the witnesses were generally unfamiliar. Tr. 3133 (Rossi), 3137 (Jeffers).

69. The County's witnesses from the schools based their opinions in large part on polls. Tr. 3090-91, 3097 (Petrilak), 3104-05 (Smith). The question asked was how long teachers would stay to implement an early dismissal and whether teachers would be able to supervise children traveling to relocation centers and at relocation centers if there were a quickly developing radiological emergency. Tr. 3092-93 (Petrilak). No poll to measure "role conflict" was ever taken for other emergencies such as blizzards. Tr. 3094 (Petrilak).

70. There is no inherent reason why people could not both see to their families and see to their responsibilities at school. Mr. Petrillak, for example, did not testify that teachers would abandon their roles, but that they would first attend to their families. Tr. 3098 (Petrillak).

71. The FEMA witness testified that "[t]he history of disaster response has consistently shown that non-emergency workers, and particularly teachers, also more than meet responsibilities when faced with emergency situations." McIntire, ff. Tr. 2086, at 5; Tr. 2136-37 (McIntire). This is consistent with Dr. Mileti's view. Cordaro et al., ff. Tr. 831, at 36, see also Tr. 1164 (Mileti). Teachers have a role under the Plan similar to their normal function. Tr. 12,194 (McIntire). The FEMA witness testified that continued improvement in training and public education would provide a higher competence level to non-emergency workers regarding the safety of their families. Tr. 2137-38 (McIntire).^{45/} LILCO will offer training and information to teachers. Tr. 1157-58, 1172 (Weismantle).

72. At TMI, teachers generally stayed at their posts during the early stages of the accident, Tr. 1348-49 (Erikson), 968 (Mileti). Dr. Erikson discounted this experience because it was at a time when there was a "great circulation of rumors" but no official advisory. Tr. 1347-48 (Erikson).

73. If some teachers were not available, for whatever reason, it appears the problem could be solved by having teachers who were left supervise larger numbers of students. Tr. 3100 (Petrillak), 3119 (Muto), 3158-59 (Jeffers), 966, 1137-38 (Weismantle).^{46/} Again, any problems can be solved

^{45/} The NRC gives great weight to FEMA's views. San Onofre, supra 17 NRC at 533.

^{46/} Cf. Consolidated Edison Co. (Indian Point), LBP-83-68, 18 NRC 811, 959 (1983).

by planning.

Ambulance Drivers and Medical Personnel

74. Ambulance drivers are provided under letters of agreement with ambulance companies. Cordaro et al., ff. Tr. 831, at 37. The FEMA witness testified that role conflict for ambulance drivers could be mitigated as it could for bus drivers. McIntire, ff. Tr. 2086, at 5.

75. Under the emergency plan, the drivers will be doing the same sort of thing they do ordinarily. They have "established or well defined roles in emergency situations." Erikson and Johnson, ff. Tr. 1455, at 30. They will be offered basic radiation training, reimbursed for their time spent in training sessions, and provided with dosimeters in a real emergency. Cordaro et al., ff. Tr. 831, at 37; Tr. 1173 (Weismantle).

76. If some of the ambulance drivers did not show up for duty, for whatever reason, and if there were no substitute drivers, it would take longer to evacuate the special groups, but the emergency response effort would not fail altogether. Cordaro et al., ff. Tr. 831, at 37. Since there is no maximum evacuation time requirement in NRC regulations, the possibility that some ambulance drivers might not show up because of "role conflict" does not constitute noncompliance with NRC regulations.

77. As noted above, the reports about hospital workers not showing up for work at TMI are largely anecdotal, and it does not appear that the workers in question had clear emergency roles. Even at so devastating a disaster as Hiroshima and Nagasaki, the evidence is that the health care professionals who were not incapacitated assembled to do their jobs. Cordaro et al., ff. Tr. 831, at 49-50.

The Red Cross

78. There is no evidence whatsoever that Red Cross personnel would fail to operate relocation centers, all of which would be over 20 miles from the plant.^{47/} See Tr. 1241 (Dilworth); see also Section X below. The FEMA witness testified that workers from agencies such as the Red Cross would assure the safety of their families before they reported for their emergency roles. McIntire, ff. Tr. 2086, at 6; Tr. 2148 (McIntire). And the record shows that the Red Cross set up relocation centers during Three Mile Island. Cordaro et al., ff. Tr. 831, at 38. Red Cross personnel are dedicated, Tr. 909 (Weismantle), well-trained, Tr. 2159 (McIntire), 976 (Weismantle), 6563-69, 6572-73 (Robinson), and organized, Tr. 2160 (McIntire). They have a clear definition of their roles. Cordaro et al., ff. Tr. 831, at 38; Tr. 2160 (McIntire). The Red Cross staffs relocation centers largely from among the evacuees themselves. Cordaro et al., ff. Tr. 831, at 38; Tr. 971-72 (Weismantle); see also Tr. 1390 (J. Johnson).

II. CREDIBILITY AND CONFLICT OF INTEREST (11, 15)

A. Conflict of Interest (11)

79. Contention 11 says that because of "LILCO's financial and institutional interests" the LILCO employees will have a "strong incentive to minimize the public's perception of the potential or actual danger involved in a

^{47/} See Philadelphia Elec. Co. (Limerick Generating Station, Units 1 & 2), LBP-84-18, 19 NRC 1020, 1046-47 (1984) ("[W]e cannot attribute much weight to a concern that the American Red Cross . . . would not be adequately prepared with resources and staff to fulfill its obligation . . .").

radiological emergency in order to avoid engendering public or LILCO shareholder disapproval of LILCO, or anti-Shoreham sentiment."^{48/} The County witnesses testified that (1) ownership of LILCO stock and (2) long employment by LILCO produced a "conflict of interest." Purcell et al., ff. Tr. 10,727, at 8-9.

80. The County witnesses did not mean, that LILCO employees would make wrong decisions consciously. Tr. 10,921, 10,929 (Saegert), 10,920-21, 10,928 (Cole), 10,918-19 (Lipsky), 10,752-73 (Lipsky, Purcell). Rather, the County witnesses contended that because of "subtle mindsets" in LILCO employees resulting from years of employment with the Company,^{49/} those employees would delay or "possibly try to take corrective actions that were inappropriate because of hopes to delay or somehow circumvent what the emergency situation was." Tr. 10,962-63 (Lipsky); see also Tr. 10,927 (Lipsky), 10,931 (Purcell), 10,907, 10,947-48, 10,751-52, 10,842 (Saegert).

^{48/} Although the conflict of interest issue is unusual, similar issues have been presented to licensing boards in the past. See Louisiana Power & Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, slip op. 38 n.39 (June 29, 1983). And it is not at all uncommon for intervenors to contend that the utility-applicant will not report safety information promptly. See, e.g., Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 936 n.61, 973, 975 (1983); see also Virginia Elec. & Power Co. (North Anna Nuclear Power Station, Units 1 & 2), LBP-77-68, 6 NRC 1127 (1977), aff'd as to this issue, ALAB-491, 8 NRC 245 (1978) (the intervenor contended that the utility management's lack of "commitment" disqualified it from operating its nuclear plant). The answer has always been that training, adherence to procedures, and NRC regulatory oversight provide the needed assurance. See Schwartz, ff. Tr. 15,143, at 2.

^{49/} The Board discounts the possible influence of stockholdings. The stockholdings of the LILCO witnesses are modest. Tr. 10,217 (Weismantle) (under 100 shares); Tr. 10,214 (Kessler) (about 130 shares). And the record does not show that every sheriff, governor, and county executive that may have authority under other plans, see Tr. 15,214 (Sears), is required to divest himself of utility stock, id.; Tr. 10,387 (Cordaro, Weismantle).

81. All sorts of experiences, biases, beliefs, personality traits, etc. can affect people's behavior in an emergency. Tr. 10,371-72, 10,377, 10,389 (Mileti). Everyone, public official and utility employee alike, has "subtle mindsets," Tr. 10,961 (Lipsky), 15,216 (Schwartz), not all of which arise from one's job, Tr. 10,961 (Lipsky).

82. Elected officials, like other human beings, are subject to conflicts of interest both of a financial sort and of other kinds. Public officials, for example, sometimes sacrifice the public interest for their own interest. Tr. 10,729, 10,731-33, (Olson). In emergencies, public officials may underplay a risk because they fear needlessly alarming the public and suffering a voter backlash at the next election.^{50/} Tr. 10,225-26 (Mileti). One of the papers cited in Suffolk County's written testimony gave a concrete example of a "conflict of interest" in public officials:

Owen and Wendell (1979) report on the National Weather Service's effort to understand why it was that local officials were reluctant to cooperate in establishing local flood-warning systems. Over 200 reasons were identified. The most important and frequent of which centered on the officials' fear of the legal liabilities associated with erroneous flood predictions. This study illustrates a rarely made point: the possible breakdown in warning systems due to official failure.

LILCO Ex. 60, at 181-82; Tr. 10,804-05 (Saegert). The County witness who cited the paper professed not to understand this point, Tr. 10,804-05, 10,969-70 (Saegert), but it illustrates that public officials, like other human beings, may be subject to a variety of influences in their decisionmaking.

^{50/} As counsel for Suffolk County said, "One's knowledge about one's job security is certainly one of the financial interest[s] that one would have." Tr. 10,221.

83. On the general principle that emergency planning ought to be structured to remove inappropriate influences on decisionmakers' judgments the County witnesses and LILCO witnesses agree. Cordaro et al., ff. Tr. 10,196, at 10-11; Tr. 10,290 (Mileti), 10,964 (Lipsky), 15,216-17 (Sears). The parties are in disagreement, however, about what measures will be effective to minimize conflict of interest. Dr. Mileti made four recommendations: (1) formalized decision and transmittal instructions, (2) advance formalized substance, process, and spacing of public information, (3) participants' knowledge that they are expected to carry out their tasks in a specified manner, and (4) knowledge that there would be a post-event audit. Cordaro et al., ff. Tr. 10,196, at 11-12 (Mileti). These principles are based on a large body of empirical research on behavior in disasters. Tr. 10,273-79 (Mileti). LILCO has followed Dr. Mileti's recommendations. Cordaro et al., ff. Tr. 10,196, at 13-20.

84. LILCO has structured LERO to foster independence from the onsite plant staff. Cordaro et al., ff. Tr. 10,196, at 28; see also Tr. 10,271 (Mileti), 10,348-51 (Weismantle), 10,351 (Cordaro). Leaders of the two unions at LILCO have stated that LERO duties are voluntary and outside the normal scope of LILCO's business. Tr. 15,700-02 (Sears); Statement of Richard M. Thompson, Aug. 30, 1984, attached to letter of Sept. 7, 1984, from Donald P. Irwin to ASLB.

85. Training can help prevent pernicious effects of "conflict of interest." Tr. 10,271 (Mileti). LILCO in its training program emphasizes the need to protect the public. Cordaro et al., ff. Tr. 10,196, at 29, Att. 8, 9.

86. LILCO has formalized the decisionmaking process with detailed procedures. Cordaro et al., ff. Tr. 10,196, at 13-15. In particular, the initial classification of the emergency, done by the onsite organization, is based on nondiscretionary emergency action levels (EAL's), which detail actual gauge and meter readings that when exceeded mandate the declaration of particular levels of emergency. Cordaro et al., ff. Tr. 10,196, at 14; Tr. 10,292, 10,317 (Weismantle). In the case of a fast-breaking General Emergency, the EAL's dictate that certain protective actions be taken. Tr. 10,293-94 (Cordaro). Mr. Sears placed considerable emphasis on the procedures for making an onsite recommendation in accordance with the EAL's. Tr. 15,223 (Sears). Although EAL's have not totally eliminated the possibility of an ambiguous situation, Tr. 15,252, 15,254-55 (Schwartz), they have reduced the potential for ambiguity. Tr. 15,224, 15,254-55 (Schwartz), 15,228 (Sears), 10,263-64 (Weismantle).

87. The Director of Local Response does not have to accept the onsite recommendation, but in extremely fast-breaking emergencies when the Director cannot be reached or the EOC has not been activated, the EBS and prompt notification systems are required to be activated. Plan, OPIP 3.1.1 § 5.4.2.c, OPIP 3.3.4 §§ 3.1, 5.1.1.c.1; see also Tr. 12,687-88 (Kowieski, Baldwin). In the more usual case, once the Director has declared a Site Area or General Emergency, the activation of the EBS system, including the sirens, is mandatory. These are the only classifications of emergency at which protective actions for the public could be recommended (except for early dismissal of the schools, which occurs at the Alert stage). Cordaro et al., ff. Tr. 10,196, at 18; OPIP 3.1.1 §§ 5.3, 5.4.

88. The Director is advised by the Radiation Health Coordinator, who is an independent consultant, not an employee of LILCO, and would therefore presumably be free of the "mindset" allegedly induced by long-term employment by LILCO. See Cordaro et al., ff. Tr. 10,196, at 14, 16-17; Erikson and Johnson, ff. Tr. 1455, at 9. One of the people filling this role would be Mr. Richard Watts, who testified on several of the contentions. Tr. 10,294 (Weismantle).

89. The Department of Energy RAP Team participates in the making of protective action recommendations, and since the RAP Team operates out of Brookhaven National Laboratory, a few miles from the plant, it would be involved promptly. Cordaro et al., ff. Tr. 10,196, at 15. A County witness found this inadequate because DOE would be in an advisory role and thus not have "authoritative status." Tr. 10,788 (Olson).

90. "Conflict of interest" as the County's witnesses use the term apparently has its hypothetical effect in less extreme situations than those described in Finding 87, when the EOC is activated and the Director makes a protective action decision based on the onsite recommendation and the advice of the Radiation Health Coordinator, the DOE RAP Team, and other LILCO members of LERO. See Tr. 10,222-25, 10,385 (Weismantle). It is hypothesized to come into effect, apparently, when the situation is ambiguous and to tip the Director's decision the wrong way in the face of all the advice from all these other sources. At the time, the Director thinks he is doing the right thing. Tr. 10,923 (Cole). And on account of this hypothesized effect the Board is asked to find the LILCO Plan fatally, and incurably, defective. The effect the County witnesses postulate seems paper-thin; the Board does not

believe, that it is a requirement of NRC regulations that decisionmakers be proved free of such imperceptible psychological effects, nor would it be possible ever to have such assurance.

91. Drills and exercises provide a test of whether emergency personnel would pause inappropriately to analyze an accident. Tr. 15,213, 15,228-29 (Sears). For example, one LILCO exercise critique indicated that a Director of Local Response was getting too involved with problem-solving. Tr. 10,299-300 (Weismantle).

92. Two witnesses testified from the NRC Staff that they had no particular concern about a utility employee making command-and-control decisions. Tr. 15,210 (Sears, Schwartz). One of them, Mr. Sears, had interviewed a number of LERO personnel and found that they understood their responsibility and stated they would perform their emergency duties. Tr. 4748, 15,189, 15,196, 15,205, 15,215 (Sears). Mr. Sears believes that understanding and accepting one's responsibility are the key factors. Tr. 15,215, 15,250-51 (Sears).^{51/} Dr. Mileti also testified that what is important is understanding one's role. Tr. 10,270-71, 10,288 (Mileti).

93. Mr. Sears testified that the fact that the LERO Directors are all part of the same overall organization is a distinct advantage,^{52/} and that in plans in which a government official makes the decisions he may delay while

^{51/} This view is consistent with Drs. Dynes' and Mileti's opinion, with respect to "role conflict," that clear definition of one's responsibility eliminates role abandonment. See Section I.B above.

^{52/} Elsewhere Mr. Sears testified that he had interviewed the onsite shift supervisors as well, and that they had read and understood a LILCO bulletin emphasizing their responsibility to notify offsite emergency response authorities promptly. Tr. 4741-42 (Sears).

calling meetings of other government personnel before acting. Sears, ff. Tr. 15,143, at 7-8; Tr. 15,213 (Sears). For example, at TMI the governor called his press secretary and the manager of the Pennsylvania Emergency Management Agency to check on the credibility of the NRC official in charge. Tr. 10,929-30 (Purcell). Mr. Sears judged, based on his interviews with LERO personnel, that LERO would not be subject to this delaying factor. Tr. 15,220-21 (Sears). There would be less of a credibility gap between onsite and offsite organizations. Tr. 15,170 (Schwartz).

94. The County witnesses believe that nothing except control by an elected official would be satisfactory. Professor Olson listed three mechanisms that he believed helped minimize conflict of interest in public officials. These are (1) accountability to the electorate, Tr. 10,746 (Olson), (2) the checks and balances of one branch of government against another, Tr. 10,746-47 (Olson), and (3) statutes requiring public disclosure, public audit, placing of holdings in private interests and blind trusts, and other legal constraints, Tr. 10,747 (Olson). The first of these is most important to Dr. Olson. Tr. 10,748 (Olson). It constitutes an "institutionalized means of rewarding or of punishing the decisions that are made by that office holder." Tr. 10,748 (Olson). Dr. Olson insisted there must be an "authoritative" overseer to give "accountability."

95. Although a County witness expressed some uncertainty, Tr. 10,753 (Purcell), the Board finds that any accident serious enough to require offsite protective actions would be subject to a post-event audit. Tr. 15,219 (Schwartz); see also Tr. 10,272-73, 10,333, 10,338 (Mileti), 10,307, 10,312 (Weismantle), 10,308-10 (Weismantle, Cordaro). Senior LERO members are

aware of this. Cordaro et al., ff. Tr. 10,196, at 19-20, 32-33. Logs are kept so that accountability for decisionmaking is assured. Tr. 10,307, 10,315, 10,338 (Weismantle). Questioning by the press or by special investigatory commissions may not be "authoritative," as a County witnesses charged, Tr. 10,754, 10,925-26 (Olson), but the NRC is. See Tr. 15,219 (Schwartz).

96. Two County witnesses testified that post-event review would not help, Tr. 10,928 (Cole), 10,926-28 (Lipsky), but the NRC will provide oversight at the time of the accident as well. Mr. Schwartz testified that the NRC regulatory oversight would help ensure that emergency decisions are prompt and appropriate. Schwartz, ff. Tr. 15,143, at 4; Tr. 15,161 (Schwartz). The utility, after calling state and local officials, calls the NRC Operations Center from the control room. Tr. 15,230 (Schwartz); Cordaro et al., ff. Tr. 10,196, at 30-31. The experience in the industry is that licensees inform the NRC of safety information promptly, very often within five minutes. Tr. 15,258 (Sears), 15,247-48 (Schwartz). There is at least one I&E person on call 24 hours a day, Tr. 15,230 (Schwartz), and he has other people he can consult, Tr. 15,231 (Schwartz).

97. The NRC has the authority to order the licensee to take action. Tr. 15,231, 15,233-36, 15,245-47, 15,257-58 (Schwartz), 15,257 (Sears). The NRC does not have this authority over state and local government authorities, and so the NRC would have more control over the offsite decisionmaking under the LILCO Plan than in other plans. Tr. 15,242-43 (Sears), 15,243, 15,248 (Schwartz).

98. Dr. Olson found this inadequate because he believed NRC regulation is only effective when applied to "routine and repetitive" activities. Tr. 10,949-51 (Olson). But this is contradicted by, among other things, the federal Master Plan for responding to radiological emergencies. 45 Fed. Reg. 84,910 (December 23, 1980); 49 Fed. Reg. 35,896 (September 12, 1984); see also Tr. 14,252-54, 14,266-67 (McIntire). The Board finds implausible Dr. Olson's thesis that public utilities cannot be trusted to make health-and-safety decisions because of the way their employees think, that NRC regulation is not effective, and that the only acceptable safeguard is entrusting health-and-safety decisions to elected officials who own no utility stock.

99. The County witnesses' views are based on their reading of political science and, allegedly, psychological literature. None of them has studied human behavior during actual disasters, although Dr. Purcell was a part of the President's commission on Three Mile Island, Tr. 10,741 (Purcell).^{53/}

^{53/} Dr. Purcell is an engineer. His first experience investigating a widespread disaster was the President's Commission on TMI. The data looked at there was "impression testimony of people," given in the aftermath of the TMI accident. His main activity in this area since then has to do with "further analysis and interpretation of the TMI accident." Tr. 10,741 (Purcell).

Dr. Olson had not personally been involved in looking at evacuation or post-event phenomenon, though he had looked at planning for such events. Tr. 10,759 (Olson). He is also responsible for emergency planning for his department at the University of Washington. Id. (Olson).

Dr. Saegert likewise had not done empirical research on emergencies. Tr. 2301 (Saegert).

Dr. Lipsky has studied police behavior, but not in communitywide disasters, and he does not base his testimony on this experience. Tr. 10,803 (Lipsky).

Professors Olson and Lipsky have studied urban riots, Tr. 10,783-85 (Olson), performing a secondary analysis of surveys taken by others. Tr. 10,785 (Lipsky).

100. Dr. Mileti has conducted research that bears on conflicts of interest. Tr. 10,199-210 (Mileti). He was also aware of a variety of incidents that illustrated cases in which public and private organizations both had and had not disclosed disaster information to the public. Cordaro et al., ff. Tr. 10,196, at 8-10. Mr. Kessler had been in situations where he or other LILCO employees exposed themselves to dangerous situations in the course of their employment. Cordaro et al., ff. Tr. 10,196, at 2-3; Tr. 10,215-16 (Kessler).

101. For the most part, the County's witnesses rejected the idea that the research literature on behavior in natural disasters sheds much light on the conflict of interest issue. They did rely on Three Mile Island, but the examples they gave to show "conflict of interest" there are unpersuasive: (1) GPU "designated its vice president for generation as spokesperson, for public briefings, and this individual displayed open anger at suggestions that coping with the accident might be beyond the capability of the utility, although this subsequently was shown to be the case," Purcell et al., ff. Tr. 10,727, at 10-11, and (2) the president of the company predicted some months after the accident that the unit would be out of service for approximately three years, a prediction that turned out to be overoptimistic, id.^{54/}

102. It is true that at TMI, according to the Kemeny Report, the utility was slow to confirm pessimistic reports about the accident. Tr. 15,168-69

^{54/} The Governor of Pennsylvania during the Three Mile Island accident called his press secretary to get his views about the reliability of an NRC source. Tr. 10,929-30 (Purcell). Dr. Purcell twice said it is "conceivable" that this case evidenced a conflict of interest by an elected official. Tr. 10,935 (Purcell). Later, after conferring with counsel, he testified that he had been confused by the question. Tr. 10,953-54 (Purcell). The County witnesses now thought that this was not evidence of a possible "mindset" or bias, but neither could they rule it out. Tr. 10,953-54 (Purcell, Olson).

(Schwartz); see also Tr. 10,328 (Mileti). But the emergency plans at TMI were very poor. Tr. 10,328 (Mileti), 10,841-42 (Purcell). Mr. Schwartz testified that regulations enacted since TMI, improvements in plans, onsite assessments by the NRC, and exercises combine to give reasonable assurance that utilities would not be slow. Tr. 15,170-71, 15,176, (Schwartz) 15,224 (Sears). The current NRC regulations and guidelines were promulgated in part precisely to prevent the types of mistakes that were made at TMI. Tr. 15,218 (Sears), 15,169-70 (Schwartz). It would be a radical decision indeed that would permanently and incurably disqualify LILCO from making safety decisions because a different utility, which did not have responsibility for offsite decisions and which was operating with pre-TMI emergency plans, performed badly in one event five years ago. TMI, after all, was an event in which just about everybody performed badly in one way or another.

103. Utilities are charged with the basic responsibility of operating nuclear plants safely. Tr. 15,162 (Schwartz).^{55/} This includes the obligation to report safety information to the authorities, even if such reporting would adversely impact the utility's financial interests. This is a basic

^{55/} Cf. Petition for Emergency and Remedial Action, CLI-78-6, 7 NRC 400, 418 (1978) ("In order to fulfill its regulatory obligations, NRC is dependent upon all of its licensees for accurate and timely information. Since licensees are directly in control of plant design, construction, operation, and maintenance, they are the first line of defense to ensure the safety of the public."). Other emergency planning decisions have recognized the utility's responsibility for monitoring releases of radioactive materials. Pacific Gas and Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-82-70, 16 NRC 756, 827 ¶ 205 (1982); Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), 15 NRC 1163, 1201-02 (1982); see also Carolina Power & Light Co. (Shearon Harris Nuclear Plant, Units 1 & 2), ASLBP No. 82-472-03 OL, slip op. 10-11 (June 14, 1984) (State initially dependent on licensees' monitoring); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-698, 16 NRC 1290, 1312-13 (1982).

feature of NRC regulation. Were the Board to find that a utility cannot make offsite safety decisions, as opposed to onsite ones, because of "subtle mindsets," the decision would be contrary to NRC regulations. See Schwartz, ff. Tr. 15,143, at 2. It would imply both that utilities should not be permitted to operate nuclear power plants and that NRC regulation is ineffective.

104. If the Board were to accept the County's theory that "subtle mindsets" rendered an offsite utility plan incapable of meeting NRC regulations, then it would be effectively ruling that no utility plan is possible. This would be contrary to the NRC regulations. Congress has twice authorized "utility plans" and the NRC, consistent with that legislation, has enacted a regulation that allows a utility plan to compensate for the lack of a governmental plan.^{56/} Finding for the County on "conflict of interest" would read the utility plan option out of the regulations.

105. There is no real "conflict" between LILCO's "financial and institutional interests" and the goal of protecting the public health and safety. Assuming that there is a "bias" in favor of the utility's interests, the evidence does not establish that it would work against the public. As everyone seems to agree, the consequences of a utility making a wrong decision and harming the public would be so devastating that it could not possibly be deemed in the utility's interest to do so. Tr. 10,361-62 (Weismantle), 10,962-64 (Lipsky); see also Tr. 10,384 (Kessler).

^{56/} Pub.L. No. 96-295, § 109, 96th Cong., 2d Sess., 94 Stat. 783-84 (June 30, 1980); Pub.L. No. 97-415, § 5, 97th Cong., 2d Sess., 96 Stat. 2069 (Jan. 4, 1983); 10 C.F.R. § 50.47(c)(1); Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), CLI-83-13, 17 NRC 741 (1983).

106. "Conflict of interest" is a form of "role conflict." The seminal paper on role conflict found that in conflicts between loyalty to the company and loyalty to fellow employees as human beings, the almost universal reaction was to think of the men first and the plant later. Cordaro et al., ff. Tr. 10,196, at 21-22. The "emergency consensus" that occurs in widespread disasters tends to deemphasize values like earning a living and to emphasize protecting people. See Section I.B above.

107. Every party active in the litigation, including the State and County who complain about "conflict of interest," has the power to correct the very problem complained about. LILCO has invited them to do so and has designed its Plan to incorporate them and to defer to their decisions if they participate. Cordaro et al., ff. Tr. 10,196, at 29-30; LILCO Ex. 80, at 1.4-1; Cordaro et al., ff. Tr. 13,899, at 8-9.

108. The fact that a particular problem of emergency planning is beyond the applicant's control is a factor to be considered under the "interim compensating measures" provision. See Consolidated Edison Co. (Indian Point, Unit No. 2), CLI-82-38, 16 NRC 1698, 1703 (1982); see also CLI-83-11, 17 NRC 731, 733 (1983). The refusal of State and local officials to assume command and control is beyond LILCO's control.

109. The Board finds that there are no "insurmountable difficulties" raised by this issue. Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 764, 765 (1982). The State or County could, if they chose, easily eliminate the conflict of interest issue. The Board cannot give a great deal of weight to the complaint of a party that arises solely on account of that party's own action or inaction.^{57/}

^{57/} See also Philadelphia Elec. Co. (Limerick Generating Station, Units 1 & 2), 19 NRC _____, slip op. 5-6 (June 4, 1984) ("Nonetheless, we note that the

110. Moreover, although this contention was admitted, the Board, having now heard the County's evidence and being satisfied that the County is alleging nothing that could not be cured by its own participation, finds that such issues are contrary to the law of the case, namely the Brenner board's direction that "if the County seeks to have its findings adopted, it must litigate before us the facts which it believes support its view that it is not feasible to implement emergency preparedness actions which would meet NRC regulatory requirements" Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-83-22, 17 NRC 608, 643 (emphasis in original), aff'd on other grounds, CLI-83-13, 17 NRC 741 (1983).

111. The Board finds that any decisionmaker, be he public or private, might be subject to subtle influences, including unconscious "mindsets," of many kinds. (The County itself suggests, in its "role conflict" contention, that a public official might let family loyalties interfere with his duty to the public health and safety. See Tr. 10,732-33 (Saegert).) The County witnesses wished to define Contention 11 to cover only job-related "mindsets," Tr. 10,961 (Lipsky), and only financial "conflicts"; they repeatedly dismissed other types of conflicts and influences as irrelevant. See Tr. 10,956-57

(footnote continued)

Commonwealth is free to purchase the permanent record dosimeters it thinks are necessary to assure the health and safety of emergency workers. Cf. Three Mile Island, 16 NRC at 1295 (presumably a requirement for permanent record dosimeters would put pressure on the licensee or Federal government to pay for them).") In deciding whether to admit late-filed contentions, of course, the Commission has long taken into account whether there are "other means" for protecting an intervenor's interest. See Texas Utilities Generating Co. (Comanche Peak Steam Elec. Station, Units 1 & 2), LBP-83-32, 17 NRC 1164 (1983).

(Saegert), 10,917-18 (Olson), 10,918 (Lipsky). The County witnesses believe they have identified a "mindset" that burdens utility employees but not public officials; however, public officials may suffer from a concern for re-election and public image that does not affect utility employees. They may downplay the risk for fear of panicking the public, Tr. 10,225-29 (Mileti). If LILCO officials might delay their decisions out of a particular kind of bias, so might public officials delay for other reasons. Tr. 15,213 (Sears). The Board believes it is neither fair nor useful to focus on only one of these potential influences, defined in a way as to make it applicable only to utility employees, and ignore all others. It is more profitable to concentrate, as Dr. Mileti recommends, on how an emergency plan might be structured so as to remove as far as possible the effects of these influences.

112. LILCO has provided checks on potential "conflict of interest" to the maximum extent possible. It has structured its organization to foster independence between onsite and offsite emergency response personnel. It has provided detailed procedures, including provisions for recording important decisions, and training. It has incorporated the Department of Energy into the decisionmaking process as well as outside consultants. It has secured the agreement of two independent scientists to review emergency information at the Emergency News Center. Tr. 10,397-98, 10,695-96 (Robinson). It has made extensive provisions for the press. Cordaro et al., ff. Tr. 1470, at 51-52; Tr. 2035-36 (Weismantle). Also, as with any nuclear emergency, the federal authorities, particularly the NRC, would be involved promptly. Finally, LILCO has made arrangements to incorporate State and local officials into the process should they choose to show up. In short, LILCO has done everything it can under the circumstances.

B. Credibility (15)

113. Contention 15, on "credibility," alleges that the public, as well as support organizations such as the Red Cross, will not respond to a Shoreham emergency in accordance with LERO's plans and recommendations because LILCO lacks "credibility."

114. Obviously, the credibility of institutions and individuals, including public officials, can vary. Tr. 2152 (McIntire), 10,443-45 (Sorensen), 10,739 (Lipsky), 10,802-03 (Lipsky, Saegert), 10,816, 10,820-21 (Cole), 10,532, 10,535 (Mileti); LILCO Ex. 65, at 14. A government official may have low credibility, Tr. 2152 (McIntire), as many utilities have, Cole, ff. Tr. 10,727, at 14. Many things can cause credibility to change. Tr. 10,532, 10,535 (Mileti).

115. There is agreement that the perceived "credibility" of a source of emergency warnings or emergency information will affect people's belief in and response to the emergency message. Cordaro et al., ff. Tr. 1470, at 27; Cordaro et al., ff. Tr. 10,396, at 41. There is also agreement that credibility is only one of a number of factors that affects belief in emergency information and evacuation decisionmaking. Tr. 10,779, 10,803, 10,805-06, 10,809 (Saegert);^{58/} Cordaro et al., ff. Tr. 1470, at 26-36; Cordaro et al., ff. Tr. 1470, at 36-41.^{59/} Finally, there is no dispute that several opinion surveys

^{58/} Dr. Saegert has her own idea about what factors affect belief in information, but it does not appear her theory is supported by empirical evidence. See Tr. 10,869 (Saegert).

^{59/} In one study of a flood cited by Dr. Saegert, the initial, general response was one of disbelief regardless of the warning source. As different kinds of confirmation of flooding occurred, that disbelief gradually changed

show that the public is distrustful of statements about nuclear power plants. See Cole, ff. Tr. 10,727, at 7-13.^{60/}

116. Suffolk County takes the position, however, that credibility is a necessary (though not sufficient) condition for effective emergency response, Tr. 10,806-07 (Cole). Dr. Cole did not know, however, if any of the papers cited in the County's written testimony said this. Tr. 10,807 (Cole). The applicant believes that low credibility can be overcome by careful design of the emergency information system, and indeed that low credibility should be assumed for the purposes of emergency planning. Cordaro et al., ff. Tr. 1470, at 41.

117. There is evidence that large segments of the general public do not trust statements about nuclear power, no matter who the source of the information is. Dr. Barnett, a cultural anthropologist, testified that participants in anthropologically based group interviews that he conducted were skeptical of receiving reliable information from any source, including the government, about emergency planning at nuclear plants. Barnett, ff. Tr. 9689, at 21-22.^{61/} The County's witness Dr. Cole found, in a survey conducted in

(footnote continued)

to belief. Tr. 10,786 (Saegert) 10,408 (Sorensen). The study compared the effects of the source of the warning on public belief, but none of the three warning sources would fit an organization like LERO, according to Dr. Saegert. Tr. 10,787-88 (Saegert).

^{60/} Some of the survey questions asked about trust in statements about a "possible accident at Shoreham," Cole at 7, others about telling the truth about "the Shoreham Nuclear Power Plant," id. at 8; see id. at 9; some asked about trust in "a LILCO official, id. 7, others about trust in a particular individual, the former LILCO Chairman of the Board, id. at 8, and one simply about the believability of "LILCO," Yankelovich survey, App. B, at 91 (Question 18), discussed in Cole, ff. Tr. 10,727, at 13.

^{61/} Dr. Cole had also held interviews, but the questions posed were in terms of "commercials" for LILCO. Tr. 10,823-27 (Cole). Even a scientist, if

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September and October 1983, that "essentially now, as in February, there is virtually no one whom a significant majority of residents trust to tell the truth about the Shoreham plant." Tr. 10,819 (Cole); LILCO Ex. 65, at 11. In February 1983, 18 percent said they would not trust the governor, the most trusted official, to tell the truth about Shoreham. Tr. 10,818-19 (Cole). When Dr. Cole modified his survey question about what people thought they would do in an emergency at Shoreham by adding that the warning came from the Suffolk County Executive, the number of people saying they would evacuate, contrary to the warning that only pregnant women and children within five miles should evacuate, increased. Tr. 10,816-17 (Cole). Dr. Cole believed many people would not believe EBS messages even if the County government were participating. Tr. 10,865 (Cole); see also Tr. 10,881 (Olson), 10,876-77 (Saegert). There is also evidence that after the Three Mile Island accident only about 10% of the people surveyed regarded state and local agencies and officials as "very reliable" sources of information during the accident. Sorensen, ff. Tr. 10,396, at 35. In a survey taken of people within ten miles of the Indian Point reactors, 23% of the people said they would distrust the County Executive, and 42% said they would distrust the then-Governor of New York. Tr. 10,845-46 (Saegert). Since no one appears to have great "credibility" with respect to nuclear power, an implication of the intervenors' position is that radiological emergency planning is impossible anywhere.

(footnote continued)

he is affiliated with a utility and if he appears in an ad for a utility, may have credibility like that of the utility. Tr. 9771 (Barnett).

118. Various reasons were given for this low "credibility." General attitudes about a utility can be influenced by such things as the level of rates. Tr. 9722 (Barnett), 10,939 (Cole). There is also evidence of a general trend of declining faith in institutions, including governmental institutions. See Barnett, ff. Tr. 9689, at 22; Tr. 10,769-71 (Saegert). Dr. Barnett testified that the credibility of nuclear utilities seems to correlate with people's overall attitudes toward nuclear power in general. Dr. Cole said it was important to distinguish between credibility on nuclear matters and credibility on other issues, Tr. 10,938-39, 10,957 (Cole). However, he also believes that almost any adverse news connected with a nuclear unit, such as cost overruns, rate increases, a uranium mining scandal, and problems with diesel generators, will adversely affect belief in emergency information. Cole, ff. Tr. 10,727, at 9, 14. On the other hand, the County witnesses did not seem to think that favorable news about passing NRC review or a FEMA exercise would improve credibility. See Tr. 10,738 (Cole). This is not entirely consistent with their views on adverse news, or with Dr. Barnett's testimony that the bringing on line of a nuclear plant on time and under budget had a positive effect on the credibility of one utility he had studied, Tr. 9762 (Barnett), or with one of Dr. Cole's surveys, in which a majority said Suffolk County should abandon its fight against Shoreham if LILCO is granted an NRC operating license. Tr. 10,820 (Cole).

119. The empirical research on disaster information shows that, while the credibility of the messagegiver is one factor affecting belief, a host of other factors is involved. The key to fostering belief is good emergency planning, particularly the design of a good emergency information system.

The record is replete with evidence that information is the key to belief. See, e.g., Tr. 9765 (Barnett), 10,491-93 (Robinson), 10,343, 10,371-72, 10,517, 10,543-44 (Mileti); see also Tr. 10,812-13 (Saegert).

120. The County's position has scant support in the scientific literature. The County witnesses discounted or ignored the bulk of the empirical research on behavior in disasters. Tr. 10,790-91 (Olson). Dr. Saegert relied very little on such literature, and found most of the empirical research deficient. Dr. Saegert believed the psychological literature has been given insufficient attention, Tr. 10,790 (Saegert), but she finds most of it methodologically flawed, Tr. 10,810-11 (Saegert).

121. The County witnesses relied heavily on their understanding of the experience at TMI, Tr. 10,794 (Cole), but presented no data. Data from TMI, from two surveys, was presented by LILCO's witnesses. These data show at least that it is possible to have low credibility (at least at one time) and yet be seen as a useful source of information (at another). Cordaro et al., ff. Tr. 10,396, at 28-29; Tr. 10,443, 10,446-47 (Sorensen).

122. The County witnesses did not address the radiological accident at the Ginna plant, where credibility did not seem to be a problem. Cordaro et al., ff. Tr. 10,396, at 37. A possible explanation is that the utility used two independent experts to verify or refute utility information for the media. Id. Tr. 10,697-98 (Clawson). LILCO has also arranged to have two independent experts, from Brookhaven National Laboratory, at its Emergency News Center. Tr. 10,446-69 (Robinson, Cordaro).

123. If there are any institutions that presently have credibility in nuclear matters, the evidence suggests they are the NRC and the Department

of Energy. Cordaro, et al., ff. Tr. 10,396, at 38; Tr. 9709, 9763 (Barnett), 11,071 (Muto), 10,819 (Cole). The NRC would be a part of any emergency response at Shoreham. Cordaro et al., ff. Tr. 10,396, at 38. The Department of Energy RAP Team, operating out of Brookhaven National Laboratory, would likewise be involved. Cordaro et al., ff. Tr. 10,396, at 39. Brookhaven National Lab has high credibility on Long Island. Tr. 10,469-70 (Cordaro), 10,470-71 (Robinson).

124. More important, the record, including data from TMI, shows that the public distinguishes on the basis of credibility between different roles even within a single organization. Cordaro et al., ff. Tr. 10,396, at 31-33; Tr. 2014, 10,448, 10,460 (Sorensen). The public regards "scientists" as the most credible in matters of nuclear power. Tr. 2014 (Sorensen). The evidence was consistent that the public trusts "scientists," particularly those with an academic affiliation, over politicians, public officials, and utility officials. Cordaro et al., ff. Tr. 10,396, at 32; Tr. 9768-69 (Barnett); see Tr. 10,845-46 (Saegert).

125. Emergency plans are not so fragile, and the NRC regulations do not require, that a nuclear power plant be shut down whenever a public opinion survey shows that people do not trust the local sheriff, county executive, governor, or whoever is in charge of emergency planning. A better approach to emergency planning is to assume low credibility and design the emergency information system so as to maximize the chance of inducing belief in the emergency information. His opinion that the factors that produce belief in emergency warnings is influenced by a large number of factors is solidly based in the research literature on emergency behavior.

126. The principal basis of Dr. Saegert's views is that she does not regard the LILCO Plan itself as "credible." This seems to mean that no matter how good the plan, people will not have confidence in it because they will rely on their own impression that the geography of Long Island makes evacuation impossible. Tr. 10,870-71, 10,876-77, 10,937 (Saegert). The empirical support for this view appears to be a question on one of Dr. Cole's surveys, responses to which indicate that many people do not think they can evacuate successfully. Tr. 10,870-71 (Saegert).

127. Because no one has credibility with everyone at all times, it is prudent to associate as many sources as possible with the emergency messages. Cordaro et al., ff. Tr. 10,396, at 32-33. LILCO's sample EBS messages say that the Director of Local Response has consulted with scientists, LILCO officials, LILCO engineers, and public agencies. Tr. 10,459 (Weismantle). The County's witnesses would not or could not answer the question whether it is better to have more than one source associated with emergency information. Tr. 10,832-37 (Saegert, Olson). Dr. Cole never asked people's reaction to a message of the sort LILCO has prepared. Tr. 10,865 (Cole).

128. The County witnesses relied heavily on opinion surveys. Tr. 10,794 (Cole). The weight of the evidence is that opinion surveys are not a reliable means of predicting what people will actually do in an emergency. See Section I above.

129. Mr. Sears testified that if the public were informed about how good the LILCO Plan is, they would have more faith in it. Tr. 15,226 (Sears). This is consistent with LILCO's view that as the public becomes

more familiar with the quality of the planning effort, credibility will rise.

Cordaro et al., ff. Tr. 10,396, at 40; Tr. 10,699-700 (Cordaro).

130. The fact of NRC approval of the LILCO Plan can be expected to improve its credibility. Tr. 10,474-75 (Clawson).

131. LILCO's witnesses were more credible than the County's. Drs. Sorensen and Mileti have studied the relationship of credibility and acceptance of emergency warnings. Tr. 10,403-07 (Sorensen), 10,407-08, 10,413-15, 10,418 (Mileti), 10,408-09 (Sorensen, Mileti). Mrs. Robinson has dealt with the public as manager of LILCO's community relations department. Tr. 10,410 (Robinson). Mrs. Clawson was a reporter for years before working for LILCO. Tr. 10,410 (Clawson). Mr. Weismantle and Dr. Cordaro are responsible for, and familiar with, the aspects of the Plan designed to inform the public. Tr. 10,416-17 (Cordaro, Weismantle).

132. The County witnesses, by and large, had not investigated disaster behavior. Tr. 10,838, 10,881-82, (Olson), 10,882 (Lipsky). They relied primarily on surveys and on conclusions they draw from general understanding of the literature. Tr. 10,847-50, 10,854-56, 10,857, 10,859-61, (Saegert), 10,854 (Lipsky). Dr. Saegert had not completed any empirical studies of real emergencies and the effect of credibility in them. Tr. 10,761 (Saegert).

1. Red Cross, DOE, Ambulance Companies,
and Coast Guard (15.A)

133. Subpart A of Contention 15, which like the other subparts was not separately admitted but treated as a reason in support of the "main" contention 15, alleged that certain organizations (the Red Cross, the DOE RAP Team, ambulance companies, fire and rescue organizations and local law

enforcement agencies, and the Coast Guard) will not believe information from LILCO and will therefore not be effective in an emergency. The LILCO plan does not rely on the fire and rescue organizations and local law enforcement agencies, except insofar as it expects them to perform their ordinary functions. LILCO has secured written agreements with the organizations it does rely on. They have agreed to participate in drills and training as necessary. See Tr. 6568-69, 6572-73 (Robinson). It is not plausible that these organizations would sign agreements to perform in an emergency, participate in drills, and then deviate from the Plan in a real emergency because they had problems with LILCO's "credibility." Moreover, the Director of the Nassau County Red Cross testified for LILCO at the hearing. See Rasbury, ff. Tr. 14,706. The County's evidence on this point was vague and unpersuasive, Tr. 10,847-50 (Saegert), and based apparently on TMI, where emergency plans were poor. Tr. 10,841-42 (Purcell).

134. It is also hard to see how LILCO's credibility, or lack of it, could have much effect on the Red Cross's setting up of relocation centers (which it does according to its own procedures), DOE's performing monitoring (which it does according to its own procedures), ambulance drivers' picking up nonambulatory members of the public who need help (where "credibility" does not seem relevant), or the Coast Guard's warning boaters about the emergency (which it does in its own way). Cordaro et al., ff. Tr. 10,396, at 72-83.

2. Sheltering (15.B)

135. The County's view that the public will not obey a sheltering recommendation is based on opinion polls and, according to Dr. Saegert, TMI. Other County witnesses testified that many people sheltered at TMI, Tr.

2868-71 (Ziegler, Johnson), though not advised to do so. Here, as for the other issues, the only remedy is advance public education and a sound information system for the time of the emergency itself.

3. Schools (15.C)

136. Subpart C of Contention 15 alleges that school officials may not believe information or follow recommendations provided by LERO. School officials from three school districts, two of them with schools inside the EPZ, testified in support of this contention. The officials from the two districts with schools inside the EPZ indicated that they would want to verify LILCO information with State or local public officials before acting. LILCO's solution to this problem is to inform the schools in advance which levels of government are to be notified in the event of an emergency so school officials would know which government officials to call. Moreover, LILCO has offered to help schools come up with a means of confirmation. Cordaro et al., ff. Tr. 10,396, at 97.

137. It appears to the Board unlikely that school officials would spend a great deal of time conferring with State and local officials who had not participated in planning. In the absence of other reliable information, the officials would likely follow the EBS advisories. Id. at 96.

138. The officials of the Shoreham-Wading River School District, which is closest to the plant, expressed no reluctance to follow LERO advisories. Doremus, ff. Tr. 9491, at 4.

139. The school administrators presented as witnesses by Suffolk County testified that they would not rely on the advice of LILCO alone but would seek to confirm it with State or local authorities. It is clear, however,

that this is not so much a problem of "credibility" as of "authority"; the school officials feel they lack authority to act without State or local government sanction. See, e.g., Tr. 11,063 (Jeffers), 11,003-04, 11,007, 11,009 (Muto), 11,012 (Jeffers), Tr. 11,017 (Muto, Smith), Tr. 11,021-22 (Petrilak), 11,018, 11,044 (Muto). Dr. Muto recognized DOE and the NRC as "reliable" sources, Tr. 11,071 (Muto), but the witnesses said they would take direction only from the State or County governments. Tr. 11,059-62 (Petrilak, Jeffers).

140. As for the Middle Country School District, which has no schools in the EPZ but some pupils who live in the EPZ, all that the district would be asked to do under the LILCO plan would be either to retain its pupils at school at the end of the school day or to institute early dismissal at the Alert stage. In the former case, the Superintendent testified that he would indeed hold the children at school while he verified the information from LILCO, and so the lack of credibility seems to be an academic point. Tr. 11,062-63 (Jeffers). In the case of an early dismissal, presumably the verification with State and local officials would take some time, and so early dismissal could not be done as quickly. In theory, the school officials could delay long enough to increase the danger to the children when they finally did decide to let them go home. On the other hand, it is doubtful that confirmation with State and local officials would take very long, Cordaro et al., ff. Tr. 10,396, at 95-96, and presumably the school buses could be summoned while the confirmation process was going on, so as a practical matter it would appear that the school officials' expressed need to confirm information with elected officials would have no effect.

141. In any event, we do not see a lack of faith by certain school officials in the information coming from LILCO as an "insurmountable difficulty." The Mt. Sinai School Board has already decided that, if the plant is licensed, it will do the best job it can, although it feels it cannot "guarantee" the safety of its pupils in a radiological emergency. Tr. 11,085 (Petrilak), 11,084 (Jeffers, Muto). Neither can the Board make such a guarantee, nor can anyone else. Nor can there be any guarantee of safety in a hurricane, fire, or chemical spill. The absence or presence of such guarantees is not dispositive.

4. Traffic Guides (15.D)

142. Subpart D of Contention 15 deals with traffic guides, alleging that LILCO's lack of credibility will cause people not to obey traffic guides.^{62/} The likely response of the public to the traffic guides is addressed in our decision on Contention 65, below.

5. EBS Messages (15.E)

143. Subpart E of Contention 15, dealing with EBS messages, has already been addressed above in the Board's decision on the "shadow phenomenon."

6. Rumor Control (15.F)

144. Subpart F of Contention 15 deals with LILCO's proposed rumor control system. LILCO has plans that the LILCO district office callboards and customer service centers will receive updated news releases and will be

^{62/} One of the authors cited by Dr. Saegert believes that untrained civilians can direct traffic in emergencies. Dr. Saegert disagrees with this recommendation. Tr. 10,791-92 (Saegert).

trained to refer rumors and questions that they cannot handle to rumor control, as they would in a storm emergency. Rumor control at the Emergency News Center will be responsible for distribution of information through the LILCO callboards. Cordaro et al., ff. Tr. 10,396, at 105-07. Moreover, the Company has a local communications network, used during storm restoration, by which the latest accurate information is relayed to the County Center and town halls. The onsite plan has a liaison with local governments to provide accurate and consistent information about an emergency. Id. at 108. Also, press conferences will be conducted periodically in the ENC and a panel will be available to provide up-to-date information on the status of the emergency. Id. at 112. Two Brookhaven National Laboratory scientists will serve as independent reviewers of information. Id. at 39, as amended; 63/ Tr. 10,397-98 (Robinson). Rumor control is commonly staffed by utility personnel using the utility's offices under other radiological emergency plans in this country. Robinson, ff. Tr. 10,396, at 109.

145. The County's chief concern seems to be that the process of checking and approving information for public release will cause delay and contribute to a public perception that the utility is covering up the truth. It is true that the public information staff is to ensure that press releases are approved by the LERO Director and reviewed by government and utility coordinators of public information before media dissemination. However, this seems prudent as a means to ensure consistency and accuracy of information.

63/ Errata and Update to "LILCO Testimony on Contention 15 (Credibility)," ff. Tr. 10,396, at 1.

7. Public Education (15.G)

146. Dr. Saegert believed the public education brochure and other educational materials prepared by LILCO would not be believed, but the studies she cited in support from other emergency plans showed simply that people could not remember receiving brochures. Tr. 10,871-72 (Saegert). In any event, the regulatory requirement is that educational material be "made available."^{64/}

III. EPZ BOUNDARY (22.D)

147. Intervenor^{65/} argue in Contention 22.D that the plume exposure pathway emergency planning zone (EPZ) "should be extended to include all of Port Jefferson, Terryville, and additional portions of Riverhead . . . 1-2 miles to the immediate east of the proposed EPZ which contain dense population and Riverhead's business district" and that the EPZ, as currently configured, does not follow basic planning principles. See Contention 22.D.

148. The criteria used to establish an emergency planning zone are contained in 10 C.F.R. § 50.47(c)(2), NUREG-0654, and NUREG-0396. Cordaro et al., ff. Tr. 8536, at 5-6; Herr, ff. Tr. 8666, at 4-5; Tr. 8539-40 (Daverio), 12,939-42(A) (Kowieski, McIntire). The regulations and guidelines define the emergency planning zone as an area of about 10 miles in radius from the nuclear power plant and suggest that the EPZ boundaries should be determined in relation to local emergency response needs such as

^{64/} Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 943 (1983).

^{65/} New York State did not present testimony on this issue.

demography, topography, land characteristics, access routes, and jurisdictional boundaries. 10 C.F.R. § 50.47(c)(2); see also Cordaro et al., ff. Tr. 8536, at 5-6; Tr. 12,942-42(A) (Kowieski). In this way, the EPZ boundary in any location is clearly defined and easily identifiable to area residents. Cordaro et al., ff. Tr. 8536, at 6; Herr, ff. Tr. 8666, at 6-7. In addition, good emergency planning principles indicate that planners should try to avoid splitting major coherent populations that fall within the ten-mile radius and should avoid creating a boundary with elongated appendages. Cordaro et al., ff. Tr. 8536, at 7; Herr, ff. Tr. 8666, at 5; Tr. 8543, 8549 (Daverio).

149. As the licensing board in Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1556-57 (1981), noted:

The Commission's regulations do not require that an EPZ boundary include the entire geographic extent of all political subdivisions that are bisected by the 10 mile circle.

The TMI board noted with approval that although the EPZ boundary was not extended to include entire municipalities, the boundaries were established to coincide with jurisdictional boundaries, natural geographic features, roads, and other readily identifiable landmarks. Further, the board declined to include all municipal areas bisected by the EPZ on the ground that it would not be desirable to create an EPZ boundary with long, nonuniform appendages that might result in confusion if protective actions were recommended for areas distant from TMI, while closer-in areas were not covered by the advisory. See also Duke Power Co. (Catawba Nuclear Station, Units 1 and 2) LBP-84-37, slip op. at 87-89 (Sept. 18, 1984) (small portion of Charlotte, NC within 9.8 miles; did not extend EPZ to whole city, which would be 15 miles).

150. Both the FEMA and LILCO witnesses agreed that the boundary for the Shoreham EPZ, which is approximately 10 miles in radius and follows well-known roads and highways, comports with the regulations and guidelines. Cordaro et al., ff. Tr. 8356, at 10; Tr. 8572-74 (Daverio); Baldwin et al., ff. Tr. 12,174, at 11; Tr. 12,943, 12,948-49 (Kowieski, McIntire).

151. LILCO's witness testified that the multiplicity of political and jurisdictional boundaries in Suffolk County precludes the effective use of those boundaries in defining the EPZ. In such situations it is better planning to adopt recognized roadways as boundaries rather than to follow obscure political or jurisdictional boundaries of incorporated villages, unincorporated areas, and other locally recognized districts. Cordaro et al., ff. Tr. 8356, at 11; Tr. 8656-57 (Cordaro); see also Tr. 8660-63 (Lieberman, Cordaro).

152. The County's witness, Mr. Herr, testified that the configuration of the Shoreham EPZ ignores planning principles used in zoning, environmental impact statements, or EPZ's, including use wide separators, avoid use of narrow streets, avoid dividing functional systems, locate the boundary in a low-density area, provide easy boundary recognition, and minimize unwarranted entry into the EPZ. Herr, ff. Tr. 8666, at 5-11. Mr. Herr concluded that the Shoreham EPZ boundary runs through the populated centers of Riverhead, Port Jefferson, and Terryville following various local narrow roads, which he defined as something less than a limited-access highway, and that the current boundaries of the EPZ would not be recognized or understood by the public. Herr, ff. Tr. 8666, at 6-7, 15; Tr. 8677-78 (Herr). He also stated that in Terryville, Riverhead, and Port Jefferson the principle of

avoiding street-centered boundaries has been violated. Herr, ff. Tr. 8666, at 8. However, he admitted that emergency planners do use roads and highways as boundaries. Tr. 8682 (Herr). Finally, he testified that he had not engaged in a thorough, definitive analysis and, therefore, could not define where the Shoreham EPZ should lie. Rather, based on his review of the Shoreham EPZ, Mr. Herr believed a boundary could be drawn that would better respect his understanding of emergency planning principles. Tr. 8741, 8747-48 (Herr).

153. FEMA witnesses testified, however, that an EPZ boundary need not incorporate whole population centers without dividing them and that the critical point for an emergency planning zone is that the population recognize the boundary. Tr. 12,952-53 (Keller). FEMA testified that reasonably well-travelled public roads would constitute a recognizable boundary that would be adequate for the definition of an EPZ. Tr. 12,944-45 (Keller).

154. As noted above, the three areas in controversy are Terryville, Riverhead, and Port Jefferson. Terryville, which is an unincorporated area situated on the western edge of the EPZ, has no political organization or readily ascertainable boundaries. The present EPZ boundary in the area of Terryville follows Jayne Boulevard, a prominent north-south thoroughfare that closely follows the 10-mile radius. Cordaro et al., ff. Tr. 8536, at 13-15; Tr. 8657-58 (Lieberman). Jayne Boulevard would be easily recognized by persons who live in the area of Terryville. Tr. 8698 (Herr). Since the boundaries of Terryville are undefined, Jayne Boulevard does not split a defined community. Tr. 8656 (Lieberman).

155. Riverhead, as it is described in the Intervenor's contention, is an unincorporated area on the eastern edge of the EPZ that has no boundaries set by law. It is an area with both populated and rural characteristics. Cordaro et al., ff. Tr. 8536, at 19-20. Contention 22.D proposes that the EPZ boundary be extended in the Riverhead area to a point almost 13 miles from the plant; this would violate the requirement that the EPZ boundary approximate a 10-mile radius and also create an elongated appendage that might cause confusion among residents of the Riverhead area. Cordaro et al., ff. Tr. 8536, at 21; Tr. 8563-64 (Daverio). The border of the Shoreham EPZ follows the limited number of roads available in the Riverhead area and, therefore, is not a straight line. Cordaro et al., ff. Tr. 8536, at 20; Tr. 8604-06, 8618-19 (Daverio, Lieberman). Osborne Avenue, which forms the EPZ border in the "downtown Riverhead" area, is a mixed-use area in which commercial uses dominate. Tr. 8626-27 (Daverio), 8683-85 (Herr). Thus, the boundary of Osborne Avenue does not split a coherent population, and there are few residents who would be confused by protective action recommendations that would affect only one side of the street. North of the "downtown Riverhead" area the EPZ boundary is located in an area of low population density -- primarily farmland, Tr. 8711-13 (Herr), 8604-06 (Lieberman), 8620-24 (Daverio), and, therefore, relatively few people are likely to be near the boundary and subject to confusion from dissimilar protective action recommendations, Herr, ff. Tr. 8666, at 11.

156. Port Jefferson is an incorporated village. The current western boundary of the EPZ begins at the mouth of the harbor and follows Main Street south through the commercial center of Port Jefferson. Cordaro et

al., ff. Tr. 8536, at 22-23; Tr. 8632-34 (Daverio). Main Street in Port Jefferson is a suitable choice for an EPZ boundary for two reasons. First, the public will recognize and remember Route 25A/Main Street in Port Jefferson, which is one of the most important roadways in the EPZ, as an EPZ boundary. In fact, more than half of Route 25A is a four-lane roadway. In contrast, the use of the Port Jefferson's village boundaries as an EPZ boundary would be impractical and confusing to the public because they follow narrow streets and frequently cut across streets and through backyards. Cordaro et al., ff. Tr. 8536, at 22-23; Tr. 8634 (Daverio); see also Tr. 8688-99 (Herr). Second, the village's most recognizable feature is the harbor, which forms a natural half-mile-wide separator. Cordaro et al., ff. Tr. 8536, at 23; Herr, ff. Tr. 8666, at 6; Tr. 8575-76 (Herr). Since the harbor is centered on Main Street, which is a major north-south commercial thoroughfare, Main Street is a natural choice for the EPZ boundary. Cordaro et al., ff. Tr. 8536, at 23. Moreover, even Mr. Herr agreed that the municipal boundary of Port Jefferson would not be a good EPZ boundary. Tr. 8740-41 (Herr).

157. The Board finds that the Shoreham EPZ boundary, which is approximately 10 miles in radius and follows well-known roads and highways, comports with the principles outlined in the regulations and guidelines. The Board finds no basis for requiring that all of Port Jefferson, Terryville, and additional portions to the east of Riverhead be included in the plume EPZ for Shoreham, nor does the Board find any basis for redefining the Shoreham EPZ.

IV. LERO WORKERS

A. Notification (26)

158. Contention 26 deals primarily with the adequacy of the LILCO Transition Plan for notifying emergency workers. Other related issues are also raised. Testimony submitted by LILCO, the NRC Staff, and FEMA concluded that the Plan provisions in question did meet the applicable standards. Cordaro et al., ff. Tr. 4014, at 30-31; Tr. 4725-26 (Sears), 12,457 (McIntire). A panel of witnesses proffered by Suffolk County, consisting of three Suffolk County police officers testified in support of the contention that the Plan was deficient. The Board finds that the Plan is adequate and that the contention lacks merit.

159. Contention 26 presents essentially five issues. Some are issues of fact. Some are issues of law. And some are mixed issues of fact and law. First, what is the time within which LERO must be notified? When does the time period begin? What tasks must be accomplished? Who must be notified before the notification process is completed? Second, what is the time within which the public must be notified? When does the time period begin? What tasks must be accomplished before the notification process is complete? Third, are there adequate personnel available, at all times, to effect the necessary notifications, including the notification of those emergency workers who may be needed? Fourth, is adequate equipment available for effecting the necessary notification? Fifth, does the Plan assure prompt notification of non-LILCO emergency response organizations?^{66/}

^{66/} Contention 26 also alludes to the adequacy of the training of those LERO workers responsible for notifying other emergency workers. This

160. It was clearly the view of the Suffolk County witness panel that the LILCO plan did not meet applicable standards for notifying emergency personnel and the public. Regensburg et al., ff. Tr. 4442, at 54. But the County testimony reflected both a consistent misunderstanding of the applicable standards and a degree of disingenuousness. For example, there is no requirement that 142 LERO workers be notified within fifteen minutes after the declaration of an Alert. Tr. 4662-63 (Snow). Similarly, the County's condemnation of practically all of the elements of the LILCO notification system (pagers, RECS lines, telephones, tone alert radios, cascading call-out systems)^{67/} stands in stark contrast to the written statements of Inspector Regensburg some two years earlier at a time when Suffolk County was actively engaged in emergency planning for Shoreham. In a January 15, 1982, letter from Inspector Regensburg to the Suffolk County Emergency Planning Group, the Inspector makes the rather sweeping statement that "concerning the communications portion of the [then Suffolk County] Radiological Emergency Response Plan" . . . , My staff and I have reviewed the revised draft and believe that it will adequately cover communications needs in the event of a radiological incident. No further changes are recommended." LILCO Ex. 13; Tr. 4672-78 (Regensburg). That revised draft plan, fully approved by Inspector Regensburg as the SCPD Deputy Inspector Communications &

(footnote continued)

training issue, along with other training issues, is addressed in the Board's findings and conclusions on the training contentions.

67/ These elements are discussed respectively in Regensburg et al., ff. Tr. 4442, at 16-26, 31-36, 40-58.

Records Bureau, relied upon much the same type of equipment that the County now condemns as inadequate, unreliable, and unworkable. Misunderstandings and inconsistencies, such as these, coupled with the repeated refusals by the County witnesses to forthrightly acknowledge and explain their prior involvement in the County's abandoned emergency planning efforts, cast doubt on both the objectivity and the probative value of the County's witnesses on Contention 26.^{68/}

Time Limitations

Notification to LERO and Emergency Workers (26.A., D.)

161. Ordinarily the occurrence or happening that precipitates the need for calling out emergency workers takes place onsite, at the plant itself. For purposes of illustration, assume that sometime prior to 2:00 p.m. the Watch Engineer in the Shoreham control room becomes aware of an unanticipated occurrence or event at the plant. Upon investigation, he concludes, at 2:00 p.m., that an Unusual Event has transpired. See NUREG-0654, App. 1. LILCO, as the licensee, must have the capability to notify state and local government within 15 minutes after declaring an emergency. See 10 C.F.R. Part 50, Appendix E, IV.D.3 (1984). In the present case, the state and local governments have refused to participate in emergency planning, and under the regulation cited above it is LERO that the Shoreham control room must be capable of notifying within 15 minutes. This notification would have to be made by 2:15 p.m. under the scenario outlined above.

^{68/} Certain LILCO Exhibits compel the conclusion that the SCPD received (LILCO Ex. 12), reviewed (LILCO Ex. 13, 15) and approved the "total communication section of the SCERP." (LILCO Ex. 14.)

162. The initial notification from the plant to LERO goes to a Customer Service worker at the LILCO Customer Service Office in Hicksville. See Plan at 3.3-1 through 3.3-4. There are five separate modes of communication available at the plant for making the initial notification to LERO. See Plan at 3.4-1 through 3.4-7; Fig. 3.4.1. The record demonstrates the capability of the Shoreham control room to notify the LERO organization within fifteen minutes after the declaration of an emergency by notifying the Customer Service worker at Hicksville. This capability is conceded by the County. Tr. 4665 (Snow).

163. This initial notification, from the plant to the responsible emergency planning entity offsite, is not within the scope of the contentions being litigated here. Notification from onsite to offsite was a Phase I emergency planning issue, and, as noted above, all Phase I issues have been resolved previously.

164. The Board finds that the initial notification from the plant to the offsite emergency planning entity is complete as of the time the LERO worker at the Customer Service desk in Hicksville receives notification from the plant. Cordaro et al., ff. Tr. 4014, at 30; see also 10 C.F.R. Part 50, Appendix E, IV.D.3 (1984). The Board expressly rejects the suggestion by Suffolk County that this notification is not complete until dozens of additional LERO workers and non-LILCO organizations have been notified.^{69/}

^{69/} The Suffolk County witnesses gave varying interpretations as to how many LERO workers would have to be notified before the initial notification to LERO became complete. See, e.g., Tr. 4456-58, 4469-70 (Snow, Regensburg, Stile), 4463 (Snow) (142 emergency workers must be notified in 15 minutes if there is a declaration of an alert or higher).

Notification to Public (26.A.)

165. After LERO is notified that an emergency of some classification has been declared, it may become necessary to notify the public. 10 C.F.R. Part 50, Appendix E, IV.D.3 (1984) requires that the plan demonstrate the capability to make the decision with respect to public notification "promptly on being informed . . . of an emergency condition." Furthermore, once the decision is made to notify the public, the Plan should have as its design objective the "capability to essentially complete the initial notification of the public . . . within about 15 minutes." The LILCO Transition Plan demonstrates the capability to make a prompt decision on public notification and to implement that decision within about 15 minutes. Furthermore, if conditions warrant and a decisionmaker cannot be reached, for whatever reason, the initial notification of the public will be carried out within about 15 minutes by procedure. Tr. 4423-25 (Daverio, Renz). The Plan has been determined to be adequate in this respect by both the Staff and FEMA. The public notification is effected through a system of 89 outdoor sirens and tone alert radios. If necessary, both of these may be activated by the LERO worker at Hicksville within about 15 minutes. OPIP 3.3.2 at 8; Cordaro et al., ff. Tr. 4014, at 31-32.

Adequate Personnel (26.A)

166. Appendix E of 10 C.F.R. Part 50, Section IV.D (1984) provides that the Plan must demonstrate the administrative and physical capability for promptly notifying emergency workers, as well as other agencies and entities who will play a role in implementing the emergency plan. In this regard, Contention 26 alleges that the LILCO Customer Service Office is not capable

of serving as the primary notification point for LERO. The contention focuses on the eight-hour midnight shift, during which only two trained LERO workers may be on duty. The Plan provides that at all times, day or night, there will be at least two trained LERO workers manning the Customer Service Office at Hicksville. Cordaro et al., ff. Tr. 4014, at 10; Tr. 4097, 4101 (Renz). The Plan's procedures describe in some detail the administrative and physical means by which these workers will perform all necessary tasks, including the following: (i) receive and verify the initial communication from the plant that an emergency has been declared, see OPIP 3.3.1; Cordaro et al., ff. Tr. 4014, at 11; (ii) notify, by pager, one or more groups of additional emergency workers, see OPIP 3.3.2; Cordaro et al., ff. Tr. 4014, at 12; (iii) verify that the notice has been sent, see OPIP 3.3.2; Cordaro et al., ff. Tr. 4014 at 13; (iv) and, if necessary, activate the Prompt Notification System, see OPIP 3.3.4; Cordaro et al., ff. Tr. 4014, at 31.^{70/} Testimony proffered by LILCO, the Staff, and FEMA affirmed the adequacy of the LERO personnel to accomplish the assigned tasks, even under those circumstances where only two people are immediately available to handle the notification process. Cordaro et al., ff. Tr. 4014, at 24; Sears, ff. Tr. 4709, at 5; Tr. 12,442-44 (Keller, McIntire).

167. The record also establishes that there are adequate backup personnel at other locations who are trained and equipped to assist in the performance of these functions. Both the primary and backup workers are trained and experienced in dealing with various types of actual emergencies

^{70/} The tasks to be performed at each level of emergency classification are described in the LILCO testimony. Cordaro et al., ff. Tr. 4014, Att. 1.

(thunderstorms, gas leaks, etc.). Cordaro et al., ff. Tr. 4014, at 24-28. Contrary to the position of the County that these workers are nothing more than untrained telephone switchboard operators, Tr. 4614 (Regensburg), they are in fact trained and experienced in coordinating the efforts of various groups of people seeking to respond to actual emergencies.

Adequacy of Equipment (26.C)

168. Suffolk County questioned the adequacy of two pieces of equipment or equipment systems -- the paging system and the Automated Verification System. Regensburg et al., ff. Tr. 4442, at 16, 40-47, 49. The Board finds from the evidence, however, that both systems are reliable and meet applicable Plan requirements for performing the functions they are intended to perform.

169. The paging system relied on by LILCO is an existing commercial system operated by Radiofone Corporation. Cordaro et al., ff. Tr. 4014, Att. 5. The geographic area covered by the system includes all of Long Island, Manhattan, and the greater metropolitan area of New York City. The individual pagers used are NEC data pagers of a type used at other reactors around the country. Tr. 4720 (Sears). Approximately 142 LERO workers will have pagers at any one time. Tr. 4150 (Renz), 4414 (Daverio). In the event maximum mobilization is required, 87 of the paged personnel will, in turn, effect a manual call-out of 823 additional workers. Tr. 4150-52 (Daverio, Renz), 4414-15 (Daverio). The LILCO plan uses substantially more pagers than any other radiological emergency response plan and is superior in this respect. Tr. 4776 (Sears); Cordaro et al., ff. Tr. 4014, at 37-38.

170. Suffolk County has attacked as unreliable or inadequate every facet of the commercial paging system. Regensburg et al., ff. Tr. 4442, at 16, 40-47. The Suffolk County attack came from a witness panel consisting of Suffolk County police. It should be noted that this same panel, two years before filing their testimony, acknowledged that a paging system would be adequate for notifying emergency workers. Tr. 4589-93 (Regensburg, Stile, Snow). The Board thus finds it curious that this panel found the proposed paging system unacceptable and inadequate in so many material aspects.

171. We find acceptable those provisions of the LILCO Transition Plan that rely on the commercial paging system for notifying emergency workers. The coverage of the system, the priority access to the system given to LILCO and other nuclear plant operators, Tr. 4117-21 (Cordaro, Daverio, Renz), and the proven reliability of the system components, Tr. 4720 (Sears), 4408-10 (Hobbs), make it not only acceptable, but probably the best means for conveying the information that it does convey.

172. In the unlikely event of total pager system failure, all emergency workers are notified through a cascading phone system. Cordaro et al., ff. Tr. 4014, at 25-29. This backup notification system is the primary notification system under many RERPs. Tr. 4722 (Sears). But few, if any, plans use the number of pagers contemplated by LERO. Tr. 4776 (Sears). Furthermore, the backup cascading phone system used by LERO is also used by the Suffolk County Police Department as its means for calling out emergency workers. Tr. 4576 (Regensburg). And, unlike the SCPD plan for an emergency call-out, where responsible personnel "grab a number of bodies [around the precinct] and start having to make phone calls. . .," Tr. 4658

(Snow), the LERO and/or LILCO workers who would implement the LERO manual call-out would be trained specifically to implement the call-out plan.

The Automated Verification System (26.C)

173. The LILCO Plan utilizes a state-of-the-art, computerized "verification" system for verifying that communications to emergency workers have, in fact, been received. The record suggests that no other utility has such a system. Tr. 4803 (Sears). The capacity of the system to receive and record simultaneously multiple verification calls from emergency workers is impressive. Cordaro et al., ff. Tr. 4014, at 19-21.

Notification of Non-LILCO Organizations and Agencies (26.E)

174. As already noted, the LILCO Plan contemplates the involvement of several non-LILCO emergency support organizations and agencies such as the Department of Energy RAP Team, the American Red Cross, the United States Coast Guard and various bus companies, ambulance companies and other supporting organizations. The primary means for notifying most of these organizations is commercial telephone. Cordaro et al., ff. Tr. 4014, at 41. The Plan provides for dedicated telephone lines or radio communications as a backup between LERO and a number of the non-LILCO support organizations including DOE, ambulance companies, and the Coast Guard. See Plan at 3.4-1 through 3.4-7, Figure 3.4.1. In addition, tone alert radios will be used to notify hospitals within the EPZ of the declaration of an emergency. Cordaro et al., ff. Tr. 4014, at 42. The primary and back-up provisions of the Plan for notifying non-LILCO organizations are adequate and meet applicable standards. See 10 C.F.R. § 50.47(a)(5) (1983); NUREG-0654, II.E.1.; Baldwin et al., ff. Tr. 12,174, at 26-27.

B. Mobilization (27)

175. Contention 27 questions whether LERO workers can be mobilized in a sufficiently timely manner to protect the public health and safety. The contention presents a number of factors that are claimed to extend mobilization times: the distance LERO workers will need to travel to their reporting locations; the congestion they will encounter on those trips; the briefings and other activities that must be conducted at staging areas; the distance some LERO workers will need to travel to pick up buses, fuel trucks, or tow trucks; and the congestion LERO workers will encounter while traveling from their reporting location to their assignment location.

176. Direct cases on Contention 27 were presented by LILCO, Suffolk County, and FEMA, which were cross-examined on three hearing days: LILCO, April 26 and 27, 1984, Tr. 7044-332, 7510-17; Suffolk County, May 1, 1984, Tr. 7332-503; FEMA, July 12, 1984, Tr. 12,758-801.

177. The aggregate testimony on this contention presents few factual disputes of substantial importance; the witnesses generally agreed on the distances LERO workers would need to travel from their homes and work locations to their initial reporting locations, and on the distances and travel times required to reach bus depots and transfer points. Instead, the disagreements on Contention 27 center on whether mobilization times should be included in the LILCO Plan, and more importantly, on how one judges whether a mobilization is "timely". NUREG-0654 provides that "[e]ach organization shall provide for timely activation and staffing of the facilities and centers described in the plan." NUREG-0654 H.4. With the exception of radiological field monitoring teams (NUREG-0654 I.8), NUREG-0654 does not

require mobilization times to be included in emergency plans. Baldwin et al., ff. Tr. 12,174, at 29; Tr. 12,785 (Keller). Including mobilization times in the LILCO Plan would serve no useful purpose. See Tr. 7058-67 (Weismantle). The key to effective decision making is the ability to assess, on the particular day of an accident, whether enough key emergency workers will be in place to carry out the emergency plan. Id. Accordingly, the most important information for the LERO Director comes from his knowledge of how mobilization occurs and the facts of the particular accident; times for specific mobilization steps would not be useful under these circumstances. Id.

178. The central question is whether the Plan provides for "timely-activation and staffing of facilities." LILCO contends that the timeliness of a mobilization scheme must be judged against a spectrum of possible accident scenarios having varying consequence and speed. See Tr. 7175-81 (Weismantle). LILCO argues that its mobilization plan, which has been streamlined as a result of drills and exercises and which permits the overlapping of various mobilization steps, has the flexibility to respond to this spectrum of accidents. Cordaro et al. (Contention 27), ff. Tr. 7043, at 8, 27. Suffolk County argues that a more static, mechanistic test should be used to appraise the adequacy of a mobilization scheme. The Suffolk County test would require the summing of the times required to complete each mobilization step. This total time would then be compared to a small subset of all possible accident scenarios comprised primarily of very fast-breaking, severe hypothetical events to conclude that LERO cannot be mobilized in a timely manner. For the reasons detailed below, we conclude that LERO workers can be mobilized in a timely manner, provided that LILCO complies with its

commitment to include "uncontrolled" evacuation time estimates in OPIP 3.6.1, which deals with protective action recommendations.^{71/}

179. Before discussing the merits of each subpart of Contention 27, it is helpful by way of background to review briefly the mobilization scheme contained in the Plan. The sequence of events in the mobilization of LERO workers is keyed to the declaration of an emergency at Shoreham. Cordaro et al. (Contention 27), ff. Tr. 7043, at 9. The degree of LERO mobilization is dependent on the classification of the emergency. Id. At the lowest classification (Unusual Event), seven members of LERO are placed on standby; the remainder of LERO is unaffected. Id. At an Alert, 212 members of LERO report to their pre-assigned duty station or staging area. Id. at 9-10. In general, these LERO workers include all personnel assigned to the EOC in Brentwood and key personnel needed to activate each staging area. Id. at 10-11. At a Site Area or General Emergency, LERO is fully mobilized. Id. at 10.

^{71/} Contention 27 discusses the mobilization of both LILCO and non-LILCO employees. However, the direct testimony of all parties and cross-examination focused almost entirely on the mobilization of LILCO employees. Accordingly, these findings will focus on those employees.

With respect to non-LILCO employees, LILCO witnesses testified that four such groups are relied on in the Plan: the Coast Guard, the DOE/RAP team, the Red Cross, and ambulance and ambulette companies. Cordaro et al. (Contention 27), ff. Tr. 7043, at 13. The Coast Guard, DOE/RAP team, and Red Cross will all be notified at the Alert stage, well in advance of the time these organizations are needed to carry out their assigned duties. Id. Ambulance and ambulette companies will be notified at the Site Area level and told to have all available equipment report to the appropriate staging areas. Id. The mobilization times for these companies were included in the evacuation time estimates for special facilities. Id. at 13-14. Thus, the Board finds that the mobilization of non-LILCO groups was appropriately considered in the LILCO Transition Plan.

Travel Distance of LERO Workers
From Initial Reporting Location (27.A)

180. Contention 27.A asserts that LERO workers live and/or work substantial distances from their reporting locations. It was generally agreed that LERO workers live and work throughout Long Island. See S.C. Ex. 28 (master call out list). Thus, these workers will need to travel varying distances to reach their initial reporting locations. Travel times can vary from a few minutes to about 2 hours. See S.C. Ex. 23 (summaries of travel time data collected during LERO drills). LILCO has attempted to minimize initial reporting distances and consequent travel times in two ways. Cordaro et al. (Contention 27), ff. Tr. 7043, at 14. First, staging area assignments have been premised on the proximity of LERO workers' homes -- generally, those to the east of Shoreham have been assigned to the Riverhead staging area, those to the west to the Port Jefferson staging area, and those to the south to the Patchogue staging area. Id. Second, call out lists have been ordered to permit those workers living closest to a staging area to be called first. Id. at 14-15; see S.C. Ex. 28.

181. Suffolk County witnesses did not dispute these factual assertions. Instead, these witnesses suggested that a second call out list, ordered by work locations, also be given to each caller to further reduce mobilization times. Tr. 7462 (Michel). The Board concludes that while this suggestion may have some marginal benefit, that benefit is not of sufficient importance to warrant inclusion in the Plan. As LILCO witness Lieberman explained, travel distances and travel times for LERO workers occur along a distribution. Tr. 7085 (Lieberman). Thus, to judge the merit of Suffolk County's recommendation, one must compare the distributions of home-to-staging area and

work-to-staging area travel times, rather than the corresponding travel times for an individual worker. See Tr. 7085 (Lieberman). Mr. Lieberman performed such a comparison for bus drivers -- the largest group of workers to report to staging areas -- and concluded that the difference in distributions was, at most, 10 minutes. Id. Suffolk County witnesses did not perform a similar comparison. Accordingly, we find little benefit in requiring the use of a second call out list.

Congestion in Reaching Initial Reporting Location (27.B)

182. Contention 27.B contends that LERO workers will encounter some congestion on their trip to their initial reporting location. LILCO and Suffolk County witnesses agreed with this general proposition. Tr. 7321 (Lieberman); Monteith et al. (Contention 27), ff. Tr. 7381, at 21. They disagreed, however, on the extent and effect of that congestion. LILCO argued that any congestion effects would be small. Cordaro et al. (Contention 27), ff. Tr. 7043, at 15. LILCO reasoned that in most cases LERO workers will be paged or called at emergency classification levels below General Emergency, where a protective action recommendation would be made. Id. In addition, LILCO witnesses noted that LERO workers would initially report to one of three staging areas or the EOC -- all of which are located outside the EPZ, thus further minimizing the potential for concurrent traffic flow and hence congestion at that early stage of an emergency. Id. Finally, Mr. Lieberman explained that, at most, 30% of commuters returning to the EPZ would be on the same roads at the same time as LERO workers; Mr. Lieberman concluded that even this concurrent flow would not measurably affect travel times. Tr. 7321-23 (Lieberman).

183. Suffolk County witnesses argued that LERO workers would encounter heavy congestion on their trips to their initial reporting locations. Monteith et al. (Contention 27), ff. Tr. 7381, at 21. They reasoned that congestion would be heavy both during evening rush hours and during work-days when pre-evacuation traffic would commingle with LERO workers reporting to duty.^{72/} Id. at 21-24.

184. After reviewing these arguments, this Board agrees with LILCO that congestion is unlikely to affect mobilization times. The commingling of LERO workers with EPZ residents making pre-evacuation trips should be limited and should not substantially affect travel times. In addition, the likelihood that an accident at Shoreham will occur during evening rush hours is small.^{73/} Finally, data on travel times collected by LILCO during drills indicate that congestion should not have a significant impact on LERO workers' ability to reach their assigned reporting locations. See Cordaro et al. (Contention 27), ff. Tr. 7043, at 22-23; S.C. Ex. 23; Tr. 7102-04 (Varley, Weismantle) (reported travel times were average times that included experiences with congested and adverse weather conditions).

^{72/} Suffolk County witnesses testified this commingling would occur because some EPZ residents would begin to return home at the first sounding of the sirens, regardless of whether an evacuation had even been ordered. Tr. 7449-50 (Monteith), 7458 (Herr). This testimony is flatly inconsistent with other Suffolk County testimony on Contention 65. Evacuation time estimates prepared by PRC Voorhees assumed that mobilization activities would not begin until an evacuation advisory had been given. Pigozzi (Contention 65, Supp.), ff. Tr. 2909, at 9; Tr. 3404 (Polk). Mr. Herr endorsed the PRC Voorhees analysis and described the difference of opinion on the beginning of preparatory activities as being "very large." Tr. 3405-07 (Herr).

^{73/} As Suffolk County witness Michel stated during cross-examination, the evening rush hour period is itself characterized by varying levels of traffic congestion. See Tr. 7440-41 (Michel). Thus, the time of severe congestion is further limited.

Processing Through Staging Areas (27.C)

185. Contention 27.C asserts that staging area activities will further delay mobilization. Staging area activities of LERO workers include obtaining dosimetry, being briefed on their field assignments, and procuring any equipment needed to perform their assignments. Tr. 7133-42 (Varley, Weismantle); Cordaro et al. (Contention 27), ff. Tr. 7043, at 11. The dispute on Contention 27.C focused on the time needed to complete these activities.

186. LILCO witnesses contend that the time required to complete these activities has been minimized as a result of a variety of time-saving measures learned from drills and exercises. Cordaro et al. (Contention 27), ff. Tr. 7043, at 16. These measures included having key staff area personnel report to staging areas at an Alert stage to ready the facilities should the emergency escalate; speeding dosimetry distribution by simplifying record forms, adding more dosimetry record keepers, and modifying facility layouts; prepackaging information packets for each job function; positioning equipment trailers to permit rapid distribution of field equipment; practicing the installation and use of radios; and providing a system which allows one group of LERO workers, e.g., traffic guides, to receive their dosimetry while another group is being briefed on their jobs and vice versa. Id. at 16-17; Tr. 7296 (Varley). LILCO witnesses estimated that the time needed to distribute dosimetry equipment to a group of workers was 15 minutes, to conduct job-specific briefings another 15 minutes, and to dispatch the workers from 5 to 10 minutes depending on the equipment the workers needed. Cordaro et al. (Contention 27), ff. Tr. 7043, at 23. LILCO witnesses also estimated that

it would take from 1 hour 30 minutes to 2 hours to activate the EOC and staging areas following the initial notification of LERO workers. Id. at 24; Tr. 7093 (Weismantle).

187. Suffolk County witnesses concluded that these staging area activities would take at least two hours to complete. Monteith et al. (Contention 27), ff. Tr. 7381, at 29-30. Their conclusion was premised not on any factual data, but rather on their interpretation of LERO's intent regarding a drill scenario, dated November 1983. Id. at 29, Att. 7. As is clear from an examination of S.C. Exhibit 24, the times contained in the drill scenario cited by the Suffolk County witnesses are not equivalent to the times required to complete given staging area activities. Thus, the Board concludes that LILCO has taken steps in reducing mobilization times associated with staging area activities and that the time estimates presented by LILCO's witnesses are reasonable.

Time to Obtain Special Emergency Response Vehicles (27.D)

188. Contention 27.D alleges that mobilization times of some LERO workers will be extended further because these workers will need to locate buses, fuel trucks, and tow trucks; travel varying distances to obtain them; and finally, prepare them for use. There was little dispute about the time needed to complete this mobilization step. As LILCO witnesses testified, preliminary matchings of storage locations for buses, fuel trucks, and tow trucks with staging areas have already been completed. Cordaro et al. (Contention 27), ff. Tr. 7043, at 19; see also LILCO Ex. 27; Tr. 6704-10 (Weismantle). During an actual emergency, LERO Bus Coordinators would begin making verification calls at an Alert stage to identify the exact number and location

of buses immediately available. This information would then be communicated to the staging areas prior to the arrival of the bus drivers. Cordaro et al. (Contention 27), ff. Tr. 7043, at 18-19. Thus, locating available buses will not affect mobilization times.

189. Both LILCO and Suffolk County measured the time and distance needed to travel between staging areas and bus companies. See S.C. Ex. 30 (LILCO time/distance measurements); Monteith et al. (Contention 27), ff. Tr. 7381, Att. 6. A comparison of these data shows that the parties are in virtual agreement on these times and distances. These travel times vary from 3 minutes to approximately 1 hour 15 minutes. Id.

190. Finally, testimony on the time needed to inspect or prepare these vehicles for use established that only a small amount of time would be required to complete these tasks. See Tr. 7286 (Weismantle).

Congestion on Trip to Reporting Location (27.E)

191. Contention 27.E, like Contention 27.B, states that LERO workers will encounter congestion in traveling from their staging areas to their emergency posts. The effect of any such congestion should be minimal. Staging areas are located outside the EPZ; thus, workers traveling to emergency posts within the EPZ will be moving countercurrent to normal evacuation traffic. Cordaro et al. (Contention 27), ff. Tr. 7043, at 21. More importantly, these trips will be short, given the geographic apportionment of emergency posts among the three staging areas. Id.; Tr. 7079-80 (Weismantle).

Sequence of LERO Mobilization (27.F)

192. In Contention 27.F, Suffolk County questions whether all LERO workers should not be mobilized at an Alert stage. Monteith et al.

(Contention 27), ff. Tr. 7381, at 23-24. LILCO witnesses explained that the reason all LERO workers are not mobilized at an Alert stage is because some activities like driving bus routes and guiding traffic will be conducted only if an evacuation is ordered. Cordaro et al. (Contention 27), ff. Tr. 7043, at 12. Accordingly, mobilizing these workers at a lower emergency classification level makes little practical sense. In addition, it is unlikely that mobilizing all LERO workers at an Alert stage would substantially reduce net mobilization times in the only really relevant situation -- an extremely fast-breaking event -- since preparatory steps like setting up a staging area would still have to be completed before workers could be briefed and dispatched. See Tr. 7175-82 (Weismantle); Cordaro et al. (Contention 27), ff. Tr. 7043, at 26.

Timeliness of LERO Mobilization

193. As was discussed above, the controversy over the timeliness of LERO mobilization centers on the resolution of two questions: first, how total mobilization time should be calculated; and, second, what accidents should be used to measure the adequacy of this response time. It is common sense, supported by testimony, that the mobilization steps described above can overlap. See Cordaro et al. (Contention 27), ff. Tr. 7043, at 25-26. For example, some LERO workers can be traveling to staging areas while other workers are being briefed or even dispatched to their emergency posts. Tr. 7293-95 (Weismantle). The LILCO Transition Plan permits this type of flexible response because, except for top LERO management, emergency posts are not preassigned to individuals; rather, posts are assigned during an actual emergency according to their importance under the circumstances. See Cordaro et al. (Contention 27), ff. Tr. 7043, at 25-26. Since mobilization

steps can overlap, simply adding the maximum times needed to complete each step together to produce a total mobilization time, as Suffolk County suggests, does not produce a representative datum for judging whether mobilization will be timely.

194. Commission guidance is clear that emergency plans must be capable of responding to a broad spectrum of accidents.^{74/} Accordingly, a mobilization scheme must be judged against such a spectrum of accidents. Consideration of only a small subset of fast-breaking accidents, as was advocated by Suffolk County, improperly biases any such judgment.^{75/} Indeed, other licensing boards have already recognized that no emergency plan is completely effective in responding to certain types of imaginable fast-breaking events.^{76/}

195. Judged against these standards, the LERO mobilization scheme will provide "timely activation and staffing of facilities" in keeping with

^{74/} See 45 Fed. Reg. 55,407 (1980) (preface to final emergency planning regulations); NUREG-0396, pp. 4-5; Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), CL1-83-10, 17 NRC 528, 533 (1983); Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit No. 1), ALAB-727, 17 NRC 760, 765 (1983).

^{75/} For the purposes of this discussion, this Board has accepted Mr. Herr's assertion that most accidents that lead to a need to evacuate have releases within one hour of their initiating event. See Tr. 7394-95 (Herr). However, the Board notes that Mr. Herr's only indication of the source of this conclusion was "my understanding from the pieces which I've read," Tr. 7395 (Herr); Mr. Herr never identified those sources. Indeed, Mr. Herr admitted that he had never studied or conducted quantitative analyses of reactor accident sequences. Tr. 7386-88 (Herr). Thus, this Board accords Mr. Herr's assertion about the speed of accidents little weight.

^{76/} Consumers Power Co. (Big Rock Point Plant), LBP-83-44, 18 NRC 201, 207 (1983); see also Union Elec. Co. (Calloway Plant, Unit 1), LBP-83-71, 18 NRC 1105, 1111-12 (1983).

NUREG-0654 H.4. For accident sequences that permit all the steps contemplated by the LILCO Transition Plan for each event level to be completed prior to the occurrence of the declaration of the next higher event level, the Plan can be implemented exactly as designed. Cordaro et al. (Contention 27), ff. Tr. 7043, at 24. For faster accident sequences, the Plan can still be carried out as designed since many mobilization activities can be carried out simultaneously. Id. at 25. Indeed, the Board finds that LILCO has taken many steps to improve the compressibility of the mobilization scheme. Only for extremely rapid accidents can the Plan not be carried out as currently contemplated. Id. at 26. To add further flexibility to its Plan, LILCO has committed to revise OPIP 3.6.1 to include evacuation time estimates for "uncontrolled" evacuations. Id. The Board believes this inclusion will help to ensure that proper protective action recommendations will be made even for very rapidly developing accidents.

C. Communications (28-34, 24.L)

196. Contentions 28 through 34 concern the LILCO Transition Plan emergency communication system.

Communications with Federal Response Organizations (28)

197. Contention 28 asserts that the LILCO Transition Plan does not include adequate or reliable means of emergency communication with certain federal response organizations. In fact, the LILCO Transition Plan provides for reliable means of communication with the federal response organizations referred to in Contention 28 by means of commercial telephone, the Federal Telecommunications System, dedicated telephone lines, and/or radio. Commercial telephone serves as a direct means of communication to each of these

federal response organizations. Cordaro et al., ff. Tr. 5823, at 7-8; Plan at 3.4-4, Fig. 3.4.1. An adequate and reliable alternate means of communication with any of these federal response organizations, and others, is provided by the Federal Telecommunications System (FTS). Cordaro et al., ff. Tr. 5823, at 7-8; Baldwin et al., ff. Tr. 12,174, at 31; Plan at Fig. 3.4.1; OPIP 3.3.2 at 40, 42; Tr. 6179-80 (Hobbs), 12,534-36 (Kowieski). Additional communication paths are provided for principal federal response organizations; a dedicated telephone line supports communications between the EOC and the DOE/RAP Team at the Brookhaven Area Office, and marine band radio links the EOC and the U.S. Coast Guard. Cordaro et al., ff. Tr. 5823, at 7-8; Plan at 3.4-3 to 3.4-4, Fig. 3.4.1; Tr. 5855-58 (Renz); S.C. Ex. 16.

198. The County asserts that LERO personnel in the EOC (the Director of Local Response and the Evacuation Coordinator) will not have direct access to the FTS line as a backup means of communication since it is located in the Shoreham Control Room. Regensburg et al., ff. Tr. 6184, at 5. There are, however, four communications paths between the EOC and the Shoreham Control Room: Centrex, commercial telephone, the Radiological Emergency Communications System (RECS), and the ESO radio frequency. Cordaro et al., ff. Tr. 5823, at 8; Plan at 3.4-1 to 3.4-7, Fig. 3.4.1. This arrangement satisfies the guidelines of NUREG-0654. See Cordaro et al., ff. Tr. 5823, at 8; Baldwin et al., ff. Tr. 12,174, at 31; Tr. 12,534-36, (Kowieski).

Communications Personnel and Repairs (29)

199. Contention 29 alleges that since the LILCO Transition Plan does not identify the number of emergency response personnel who will be manning communications equipment at the various emergency response facilities, there

is no assurance that emergency communications can or will be operated during a radiological emergency. Such an enumeration, however, is not required by the applicable regulations or guidelines. We find that the LILCO Transition Plan, in listing the normal job titles of those individuals designated to fill communicator roles, does provide an indication of the number of personnel expected to man communications equipment. In addition, LILCO's testimony identifies the number of personnel expected to man communicator roles and states that, during a radiological response, many positions within LERO are expected to use communications equipment routinely. Cordaro et al., ff. Tr. 5823, at 9-11, Att. 1; OPIP 2.1.1 at 66, Att. 3; Regensburg et al., ff. Tr. 6184, at 5-6.

200. Contention 29 further alleges that trained repair technicians are not provided in the LILCO Transition Plan. The applicable standards require simply that adequate communications equipment be provided and maintained. We find that the Plan provides for the periodic testing of communications equipment, identifies a sufficient number of communicators, and provides that the Lead Communicator will be responsible for maintaining the operational status of communications equipment. Plan at Figure 4.1.2(2 of 2); OPIP 2.1.1 at 65; OPIP 3.4.1. NUREG-0654, moreover, does not require a specification of equipment repair capabilities. Cordaro et al., ff. Tr. 5823, at 11-12; Tr. 12,539-40 (Keller), 12,541 (Kowieski).

201. We also find adequate provisions to assure the coordination of necessary repairs to telephone equipment; a representative of the New York Telephone Company will be located at the EOC during an emergency response. Cordaro et al., ff. Tr. 5823, at 12; Plan at App-B-28; Tr. 5909 (Renz). In

addition, communications technicians holding appropriate FCC licenses will be called out by procedure to report to the EOC during an emergency response to perform any necessary repairs to radio equipment. Cordaro et al., ff. Tr. 5823, at 12; Tr. 5899-5908 (Renz).

202. With respect to emergency response facilities other than the EOC, the LILCO Transition Plan contemplates that repairs to communications equipment will be coordinated from the EOC, or replacement equipment will be on hand at the facility in question. Cordaro et al., ff. Tr. 5823, at 13; Tr. 5912-13 (Renz). We find that adequate provisions exist for replacement or repair of communications equipment should the need arise during a radiological response; this provides reasonable assurance that communications equipment will be operable in an emergency.

Communications Organization and Equipment (30)

203. In Contention 30, intervenors raise a number of issues concerning the need for and ability of LERO workers to communicate with one another. First, Contention 30 alleges that the LILCO Transition Plan fails to provide for sufficient and adequate equipment to insure effective communications among LERO field emergency personnel. LILCO's witnesses and the County's witnesses disagreed as to how to construct a radio communications system to implement an evacuation plan. There appear to be two ways to construct an emergency communications system: operational and administrative. An operational system appears to be one which depends upon direct "lateral" communications, i.e., communications between the same level of emergency workers, such as traffic guides. Based on their experience as police officers, the County's witnesses believe an operational system providing for such lateral

communications between field personnel is always needed for effective traffic control. Regensburg et al. ff. Tr. 6184 at 31; Tr. 6211-13, 6243-50 (Snow). The County's statements are apparently derived from their experience in responding to situations on an ad hoc basis rather than participation in the design or implementation of a large scale pre-planned evacuation. See, e.g., Tr. 6244-45, 6247-48 (Stile, Snow). This is demonstrated by the County's acknowledgment that no one on the County's panel was familiar with the development of an evacuation plan of this nature. Tr. 5419, 6194 (Snow); see Tr. 5940-41 (Hobbs).

204. In contrast to an operational communications system, it appears that an administrative system is organized as a hierarchy. Communications proceed from a command and control center, such as a staging area or the EOC, to the field. An administrative system is composed primarily of "up and down" communications rather than lateral communications among field personnel. Tr. 5927-30 (Renz, Cordaro). LILCO indicates, and the County agrees, that LILCO's system is administrative in nature. Tr. 5970 (Renz), 6211-13, 6216 (Snow). LILCO argues that this system is better adapted to implement a preset evacuation plan. Cordaro et al. ff. Tr. 5823, at 15; Tr. 5929-30 (Cordaro), 5934-35, 5940-41 (Hobbs), 6211-13, 6216 (Snow).

205. The major point of difference between LILCO and the County, which pervades the testimony on Contention 30, is simply this: who will make decisions with respect to traffic flow, and when will those decisions be made? In LILCO's view, all or virtually all decisions with respect to traffic flow will be made by LILCO planners before any evacuation takes place and traffic guides will implement that preset plan; this should require no extensive

communications between traffic guides. See, e.g., Tr. 6166 (Hobbs). The County's witnesses, on the other hand, asserted that field personnel performing traffic functions need to communicate by radio with each other on a frequent basis to coordinate traffic flow. Regensburg et al., ff. Tr. 6184, at 19-21. The County's witnesses stated that the LILCO Transition Plan does not take into consideration a strategic decisionmaking process needed to be performed by field supervisory personnel in an operational system. Tr. 6211-12, 6216 (Snow). The record makes it clear that the County's position derives from the assumption, based on the prior experience of the County's witnesses as police, that traffic guides and field supervisors themselves should decide on which way, and how, to direct traffic rather than implement a preset traffic plan. See, e.g., Tr. 6212-13, 6221-22, 6242-53 (Snow). The County thus believes that strategic decisions need to be made by supervisory personnel in the field, at the time of the evacuation, in order to alleviate or avoid traffic congestion. Tr. 6214-15, 6248-49 (Snow).

206. The Board finds that because the organization of the response is planned in detail by traffic professionals in advance, rather than devised on the spot by field personnel, the LILCO Plan does not depend upon extensive communications among field personnel. See Codaro et al., ff. Tr. 5823, at 15; Tr. 5930 (Codaro), 5934-37, 5939-41, 6166 (Hobbs), 6167-68 (Daverio), 6211-13, 6216 (Snow). The LILCO preplanned response precludes any strategic decision-making process at the field level. Indeed, under the Plan, there should rarely be a need for communications among field personnel. See Codaro et al., ff. Tr. 5823, at 15; Tr. 5961-62 (Codaro), 5970 (Renz).

207. The County further alleges that personnel from different staging areas will use different channels, and thus that field personnel may be unable to communicate with other field personnel performing the same or related emergency functions. Regensburg et al., ff. Tr. 6184, at 31, 33-36. This indicates that all traffic guides, in the County's view, should be able to communicate with all other traffic guides throughout the EPZ; otherwise, we fail to comprehend the point of the County's assertion. Cross-examination of the County's panel, however, revealed that those witnesses would prefer to use even lower-powered frequencies than LILCO, permitting only four or five traffic guides to communicate with each other. See, e.g., Tr. 6244-46 (Snow). Those frequencies, in turn, would be monitored by numerous field supervisors who would have the capability to communicate with other field supervisors on a separate channel. Tr. 6246-53 (Snow, Stile). This particular organizational feature is similar to LILCO's organization, in which traffic guides communicate with staging areas on three separate channels, and staging areas communicate with the EOC via separate dedicated telephone lines and commercial telephone. Cordaro et al., ff. Tr. 5823, at 19-20, 30-31; Plan at 3.3-3 to 3.3-4. The difference, as stated above, is that LILCO's Plan uses an administrative system of communication and does not require communication among field personnel.

208. Contention 30 also raises the issue of the number of radio users per channel. Suffolk County's testimony focuses on 3 of the 5 radio channels provided in the LILCO emergency radio system. Regensburg et al., ff. Tr. 6184, at 15-16. Each one of these channels is dedicated to one of the three staging areas and is assigned approximately 50 users. Regensburg et al., ff.

Tr. 6184, at 15-16; Tr. 6207-08 (Regensburg). The County opined that 50 users per channel is far too many to be assigned to the functional area of traffic control due to the air time demands of each traffic guide, and that it would be unrealistic to expect that these radio channels can be controlled because each traffic guide will need 15 minutes or more of air time every hour. Regensburg et al., ff. Tr. 6184, at 17-18, 20; Tr. 6218 (Snow); but see Tr. 6219 (Snow). In addition, the County's testimony implies that the design of the system -- which provides that field personnel communicate directly with a staging area, which in turn communicates directly with the EOC -- is insufficient because it does not allow direct communication between the EOC and field personnel. Regensburg et al., ff. Tr. 6184, at 14; see Findings on Contention 32. Again, Suffolk County's witnesses base their opinion upon police experience in the field in responding to isolated, tactical events which develop, and are responded to, with little or no prior planning and which do require heavy radio use in order to develop and implement a response as the event develops. See, e.g., Tr. 6211-13, 6215, 6244-45, 6249 (Snow).

209. On the other hand, the LILCO Emergency Radio System primarily serves to administer the implementation of, and is consistent with, a detailed preset evacuation plan. Tr. 5961-62 (Cordaro), 5970 (Renz). The County's estimates of air-time demand depend upon the assumption, which the Board rejects, that traffic guides will need to make, and communicate, ad hoc decisions rather than implement a preset plan. The LILCO communication system is adequate because it is not designed to serve an "operational" function as asserted by the County. Tr. 5970 (Renz), 6166 (Hobbs); see 6212-13, 6218-19, 6221 (Snow).

210. The County questioned whether range limitations on simplex radio frequencies, particularly the Riverhead staging area frequency, might prevent communications in some areas. LILCO's witnesses testified that LILCO uses simplex frequencies successfully in LILCO's normal operations, Cordaro et al., ff. Tr. 5823, at 18-19; Tr., 5993-94 (Renz), and demonstrated that range limitations have not been a significant problem in the more recent training drills, since the original design of the system was reorganized, Tr. 11,768-71, 12,059-60 (Renz); see Babb et al., ff. Tr. 11,140, at 65.

211. The County also asserted that a phenomenon called "heterodyning", when two or more radio users attempt to transmit simultaneously, would inhibit or prevent communications, particularly among traffic guides. Tr. 6185-90 (Snow; Stipulation by Counsel). This appears to be a problem common to virtually all means of radio communication. LILCO demonstrated that this should not be a significant problem, because of the limited nature of traffic guide communications and the ability of the staging area to control communications on the channel and correct any problem. Tr. 6166-67 (Hobbs).

212. Contention 30 also alleges that since the LILCO Transition Plan contemplates the use of mobile radios, communication will only be possible if field personnel are in their vehicles, and that vehicle batteries may go dead. LILCO's testimony demonstrates that although a field person must be in his vehicle to transmit a message, he need only be within several feet of his vehicle in order to hear a message. The only category of field personnel that may be away from a vehicle while performing response functions are traffic guides. However, because the traffic guides are to implement a preplanned

response, the bulk of communications with these field personnel will be at times prior to the set-up and after the dismantling of their respective posts; i.e., traffic guides will report when they arrive at their posts and when they leave. Cordaro et al., ff. Tr. 5823, at 16; Tr. 6166 (Hobbs). Furthermore, it is not likely that communications with traffic guides will be needed while they are away from their vehicles, because traffic guides facilitate the movement of traffic following a preset plan and it is not likely that changes will be made to the evacuation plan on an ad hoc basis. See Tr. 2344 (Lieberman), 5961-62 (Cordaro), 5967-71 (Renz, Daverio).

213. With regard to vehicle batteries, LILCO's testimony shows that the mobile radios can receive messages for at least 10 to 16 hours on the power from an average car battery without the motor running, and that LERO workers are trained to start their vehicle when making long transmissions to maintain battery levels. Cordaro et al., ff. Tr. 5823, at 17; Babb et al., ff. Tr. 11,140, Att. 16, at 12; Tr. 5979-80 (Renz). The County witnesses made no contrary proffer as to how long it would take a radio to drain a vehicle battery.

214. The County's testimony does not address the portion of Contention 30 which alleges that the general public will have access to the radio frequencies utilized by LILCO's emergency radio system. We find that although it is conceivable that members of the general public could monitor these radio channels using the proper equipment, it is doubtful that this would impair the emergency response. Cordaro, et al., ff. Tr. 5823, at 17; Tr. 5980-81 (Renz, Hobbs).

215. We find that the LILCO Emergency Radio System was designed to serve as an administrative system in order to implement a large-scale, predefined and detailed evacuation plan and that this system is well adapted to provide an adequate response under that predefined plan. Tr. 5970 (Renz), 5961-62 (Cordaro); see Tr. 6211-12 (Snow). Furthermore, we find that since this is a predefined plan, actions will not be formulated by field personnel; therefore, extensive "lateral" radio communications among field personnel are neither necessary nor desirable. Cordaro et al., ff. Tr. 5823, at 15; Tr. 5961-62 (Cordaro). Any major traffic problems will be communicated to and resolved by command and control personnel. The Board notes that similar "administrative" communications systems are used at other nuclear sites, such as the Vermont Yankee site which has three states within its EPZ. Tr. 5930-31 (Hobbs).

Backup for Radio System (31)

216. Contention 31 alleges that 10 C.F.R. Part 50, App. E, § IV.E.9 and NUREG-0654, § II.F.1 require a backup to the communication system for field personnel, and that the LILCO Transition Plan lacks provisions for a backup to the LILCO Emergency Radio System because there are no backup radio channels for field personnel. Regensburg et al., ff. Tr. 6184, at 28-32. LILCO asserts that a backup communication system is not required for the field emergency response personnel listed in Contention 31. Cordaro et al., ff. Tr. 5823, at 26. LILCO further asserts that although there are no backup radio channels, commercial telephone and other Emergency Radio System locations are available to provide backup means of communication. Cordaro et al., ff. Tr. 5823, at 24-25. We find that a backup, in the form of

additional radio channels, is unnecessary for adequate emergency communications. Furthermore, we find that there are no specific requirements for backup communications capabilities between coordinators in the EOC and field personnel. Baldwin et al., ff. Tr. 12,174, at 35.

Communications Among Field Personnel (32)

217. Contention 32 alleges that since field personnel will receive their direction from one of the three LILCO staging areas -- who in turn receive direction from the EOC -- the resulting lack of direct communications between field personnel and the EOC will delay implementation of emergency response actions. The LILCO Transition Plan provides for coordinated and expeditious communication of information; the chain of command is structured with the EOC dictating command and control directives; and the three staging areas serve as satellite field control points for communicating information to the EOC from the field and for implementing decisions made at the EOC. LILCO asserts that this organizational structure is based on the number of field personnel engaged in various emergency response functions, the manageability of communications with personnel in the field, and the type of information being communicated. Cordaro et al., ff. Tr. 5823, at 28-29.

218. We agree with the LILCO and FEMA witnesses that, with this design, the command and control functions performed at the EOC are not encumbered by small details associated with the implementation of a preset plan in the field. Staging areas can assimilate or deal with these details, thus providing efficient communications. This organizational structure, in our opinion, should not delay the implementation of emergency actions. Cordaro et al., ff. Tr. 5823, at 28-30, Att. 5; Baldwin et al., ff. Tr. 12,174, at 36.

DOE RAP Teams (33)

219. Contention 33 states that the LILCO Transition Plan fails to demonstrate that there are any direct communications between the DOE RAP monitoring teams and the EOC.^{77/} LILCO correctly notes that there are direct multi-channel radio communications between the DOE RAP teams who collect field survey data and the DOE Brookhaven Area Office where dose assessment functions, based on field survey data, are carried out. Similarly, there are direct communications between the Brookhaven Area Office and the EOC by means of a dedicated phone line, commercial telephone, and the Federal Telecommunications System line connected to the Shoreham control room. Cordaro *et al.*, ff. Tr. 12,948, at 5.

220. The FEMA witnesses testified that they preferred the use of radio, and in fact knew of no plan that considered anything but radio, as a means of communication between monitoring teams taking measurements in the field and the dose assessment staff performing the interpretation of those measurements. Tr. 14,315-18 (Keller). The LILCO Transition Plan does provide such direct radio communication between the field monitoring teams and the dose assessment function performed at the Brookhaven Area Office. Tr. 13,959 (Renz). FEMA further testified, based on its observations in drills on at least four separate occasions, that there have not been any major problems associated with the implementation of a similar system in the state of New Jersey. Tr. 14,319 (Kowieski).

^{77/} Contention 33 was rewritten by the Board after other issues raised by the Contention, as filed, were resolved by summary disposition.

221. We find no basis for requiring "direct" communications between field monitoring teams and the EOC; LILCO's plan for direct communication between the field monitoring teams and the dose assessment function ensures accurate transmission of the data. We therefore reject Contention 33.

Medical Support Facilities (34)

222. Contention 34 alleges that the LILCO Transition Plan fails to insure adequate communication among response personnel because it relies upon existing communication links in hospitals, private ambulance companies, and vehicles, citing NUREG-0654 Section II.F.2. We agree with FEMA and LILCO that the LILCO Transition Plan complies with that element of NUREG-0654 because the Plan provides "coordinated communication links" by combining telephone and/or radio links between the EOC and the "fixed and mobile medical support facilities." Cordaro et al., ff. Tr. 5823, at 34-37.

223. Contention 34 further alleges that communications between command and control personnel in the EOC and the various medical support vehicles and facilities cannot be effected in a timely manner. LILCO testified that since the support organizations and personnel will use communications equipment used routinely on a daily basis, communications will be effected in a timely manner. Cordaro et al., ff. Tr. 5823, at 37. We find that the Plan meets the planning standard referenced in Contention 34 and that it is accepted practice to configure a coordinated communications link in this manner. Baldwin et al., ff. Tr. 12,174, at 39-40.

Dispatch Locations (24.L)

224. In Contention 24.L the Intervenor's allege that LILCO has no agreements with "dispatch locations" to relay communications between LERO

personnel in the EOC and emergency response personnel expected to drive ambulances and ambulettes during an emergency. We find that the contracts with ambulance companies adequately provide for dispatch locations and dispatchers so that transportation for special facilities can be mobilized during an emergency. The "dispatch locations" referred to in Contention 24.L are those at each of the ambulance companies contracted with by LILCO. Cordaro et al., Tr. 4/6/84 Vol. II, at 20-21. A dispatcher employed by each ambulance company is available 24-hours a day, as provided for in the contracts. Id. at Att. 13-21.C, at 6-7; Tr. 6429, 6534-35 (Robinson). Should the ambulance company not have the communications equipment to accommodate LILCO during an emergency, the contracts between LILCO and ambulance companies provide that "the contractor [the ambulance companies] shall allow the company [LILCO] to install at the company's expense, communications equipment at the contractor's designated facility. Said equipment will be utilized by the company's emergency operations center [EOC] to coordinate the dispatch of the contractor's vehicle pursuant to this contract." Id. The contracts with the ambulance companies, therefore, provide for dispatch operators to work under LERO's direction from the EOC. Additional agreements with particular operators are unnecessary.

V. TRAINING (24.S, 39-41, 44, and 98-100)78/

225. In these contentions, Intervenor's raise a number of issues concerning the adequacy of the LILCO training program and LILCO's ability to

78/ New York State presented no testimony on the training contentions.

ensure that it has a fully trained and staffed offsite response organization. The fundamental questions underlying the training testimony are: How will the public behave in a radiological emergency? and what training or experience do LERO workers need to deal with the public's response? The difference in the responses of LILCO and Suffolk County to these questions accounts, in large part, for the differences in their opinions about the LERO training program. Suffolk County's basic premise is that the general public will exhibit riotous or aberrant behavior in a radiological emergency. Consequently, the County's witnesses are of the opinion that LERO workers must be trained to deal with anxious evacuees and crisis conditions. See, e.g., Cosgrove (Training), ff. Tr. 13,083, at 17-18, 22, 30-32, 42, 64, 70, 72-73, 76-77. However, not one of Suffolk County's witnesses on training had ever studied the behavior of the public in an emergency. Tr. 13,145-46, 13,150 (Fakler), 13,104, 13,147 (Lipsky), 13,149-50 (Cosgrove).^{79/} In contrast, LILCO's position is that the public will not exhibit aberrant behavior in a radiological emergency but will behave in a civilized manner. Cordaro et al., ff. Tr. 1470, at 11-16; McIntire, ff. Tr. 2086, at 7; Tr. 11,480-82, 11,489, 12,069 (Mileti), 10,764, 10,767-68, 10,772, 10,780, 10,812 (Saegert).

^{79/} Throughout the County's prefiled testimony Professor Lipsky expresses his opinion on the entire LERO training program, yet he testified on voir dire that he had little experience in designing a training program, had no experience in training for the type of jobs LERO workers perform, had only reviewed three or four of the 21 LERO training videotapes, that his review of the training materials generally was limited to the material for field workers such as bus drivers and traffic guides, and that he had never done any studies or literature reviews of either natural disasters or technological disasters such as TMI or chemical spills. Tr. 13,104-07 (Lipsky). Little weight can be placed on Professor Lipsky's testimony because of his limited prior experience with either the behavior of the public during an emergency or skills training and because of his limited review of the materials.

LILCO's position is supported by the persuasive testimony of Dr. Mileti who has extensively studied the public's response to emergencies and by traditional authority in NRC caselaw. Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 955-60 (1983); Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-82-70, 16 NRC 756, 825 (1982). The Board agrees with LILCO's assessments of the public's anticipated behavior in an emergency and with the resultant effect on the LERO training program. In short, LILCO has determined it is not necessary and probably would be inappropriate to instruct LERO workers in crowd control and other crisis intervention tactics when it is unlikely that the Long Island public will exhibit the riotous behavior requiring such control. See Tr. 12,069 (Mileti).

A. Training of Non-LILCO Personnel (24.S, 39.B, and 98)

226. In the event of an emergency at Shoreham, LILCO will rely on certain non-LILCO organizations to provide services in support of the LILCO/LERO effort. These support organizations, which include ambulance companies, the Coast Guard, DOE, Impell, Island Helicopter, and the Red Cross, will receive training. Organizations such as schools, hospitals, nursing homes, and other special facilities, which like the general public may be called upon to take action during an incident at Shoreham, are not support organizations but will be offered training and information sessions annually. Cosgrove (Training), ff. Tr. 13,083, at 3; Cordaro et al., ff. Tr. 6457, at 33-36; Babb et al., ff. Tr. 11,140, at 4-5, 78-82; Tr. 6558, 6563-64 (Robinson); Plan, at 5.1-6.

227. Title 10 C.F.R. § 50.47(b)(15) provides that "radiological emergency response training is provided to those who may be called upon to assist in an emergency," and NUREG-0654 II.O provides that "each organization shall establish a training program for instructing and qualifying personnel who will implement radiological emergency response plans." The Board finds that, under the regulations and guidelines, training need only be provided to organizations providing essential support services. Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 791-92, 846 (1982); see Babb et al., ff. Tr. 11,140, at 78; Tr. 14,523-24 (Keller).

228. Organizations providing essential support services under the LILCO Plan can be divided into two groups. The first group, which includes the U.S. Coast Guard, ambulance personnel, helicopter personnel, and Impell personnel, will be provided LERO classroom training and will participate in the exercise program because they are called upon to support LERO for situations that, while similar to their normal activities, are in many respects unique to their LERO response actions. The second group, which includes the American Red Cross and DOE RAP, are called on to support LERO in activities that these organizations conduct as part of their normal response actions. They will participate in the exercise program. Babb et al., ff. Tr. 11,140, at 26, 84-86; Cordaro et al., ff. Tr. 14,707, Att. 1; Tr. 11,413-16 (Daverio), 6575-77 (Weismantle), 6578-80 (Robinson); see also Tr. 8414-15, 13,109-11 (Cosgrove).

229. In their testimony on Contentions 24.S and 98, Intervenor state that LILCO has no agreements with schools, hospitals, nursing homes, other special facilities, the American Red Cross, or the Department of Energy to attend training and periodic retraining. Without agreements, Intervenor maintain there can be no assurance that personnel at these organizations (1) will understand that they have been assigned emergency response functions by LILCO; (2) will understand what the performance of those functions during a radiological emergency entails; (3) will understand how they are to perform those functions under the LILCO Plan; and (4) would be either capable or willing to perform the functions. Cosgrove et al., ff. Tr. 8405, at 5-6; Cosgrove (Training), ff. Tr. 13,083, at 11-12.

230. First, LILCO is not required by the regulations or guidelines to provide training to schools and other special facilities; therefore, LILCO need not have agreements with those entities to provide training. In addition, the evidence shows that it is not necessary to train people to do in an emergency what they already know how to do. For example, school officials do not require special training to supervise children in implementing protective actions because their normal task is to supervise and protect the school children in their care. Babb et al., ff. Tr. 11,140, at 78-79; Tr. 1157-58, 1175 (Weismantle), 11,846-52 (Daverio, Cordaro, Milet), 12,192-95 (Kowieski, McIntire), 14,523-24 (Keller). The Board finds unpersuasive Suffolk County's attempts to portray the role of school personnel during a radiological emergency as unique. See Tr. 13,383-85 (Fakler), but see Tr. 13,122-23 (Cosgrove); see also Kansas Gas & Elec. Co. (Wolf Creek Generating Station, Unit No. 1), ASLBP-81-453-03 OL, 20 NRC ____, slip op. at 22-24, 70-71 (July 2, 1984).

231. LILCO will offer training and retraining annually to organizations such as schools and special facilities that are required to take actions similar to those of the general public in an emergency. Plan, at 5.1-6; Tr. 1172 (Weismantle), 13,223 (Lipsky). There is no reason to believe that such organizations would not accept training without letters of agreement. Tr. 11,864-66 (Daverio, Cordaro). This provision is an adequate mechanism for initial training and retraining of these organizations. Tr. 14,523-26 (Keller). Suffolk County's testimony that there was no assurance these organizations would be trained was not persuasive and was contradictory. Compare Tr. 8412 (Cosgrove), 13,219 (Fakler) with Tr. 13,108-09 (Cosgrove).

232. Under the LILCO Plan, the American Red Cross provides the essential service of operating relocation centers. The Red Cross has demonstrated its awareness of this response role and its willingness and capability to perform it in letters of agreement between it and LILCO. Cordaro et al., 4/6/84 Vol. II, at 34-36, Att. 25, 27; Cordaro et al., ff. Tr. 14,707, Att. 1. Red Cross personnel do not require training to perform their role under the LILCO Plan because they will perform their normal response function of setting up a relocation center, for which they have already received Red Cross training. Red Cross personnel will, however, participate in LERO drills and exercises. Cordaro et al., ff. Tr. 14,707, Att. 1; Babb et al., ff. Tr. 11,140, at 26, 85-86; Cordaro et al., 4/6/84 Vol. II, at 35, Att. 25, 27; Tr. 1173 (Weismantle), 2159 (McIntire), 6569, 6572-73 (Robinson), 11,416 (Daverio).

233. The Board finds unpersuasive the Suffolk County witnesses' attempt to discount the letters and the Red Cross's experience by noting that the Red Cross has not run relocation centers in a radiological emergency. Equally unpersuasive is the Suffolk County testimony that a letter of agreement^a for training is needed. That testimony was based on a perceived need for training Red Cross personnel to interface with LERO personnel at the decontamination and monitoring facilities, Tr. 8424-26, 13,379-82 (Cosgrove), and is mooted by LILCO's proposal to provide monitoring and decontamination at a central location. See Tr. 14,801-02 (Rasbury)

234. DOE's letter of agreement with LILCO recognizes that DOE RAP's role in response to an incident at Shoreham will be to perform its normal radiological assessment function, for which DOE RAP personnel receive training through DOE, but does not address training. Cordaro et al., 4/6/84 Vol. II, at 35-36, Att. 33; Babb et al., ff. Tr. 11,140, at 85-86; Tr. 6573 (Robinson); see also Tr. 8414-15, 13,109-11 (Cosgrove), 1172, 1174 (Weismantle). DOE RAP personnel will not receive LERO classroom training; however, DOE has orally agreed to participate in the exercise program. Babb et al., ff. Tr. 11,140, at 26; Tr. 6573-74 (Robinson), 11,416 (Daverio).

235. FEMA recommended that the LILCO Plan be clarified to reflect the actual participation of DOE RAP personnel in radiological monitoring exercises. Baldwin et al., ff. Tr. 12,174, at 22.

236. Suffolk County's witnesses testified that without a letter of agreement stipulating that DOE RAP personnel have agreed to participate in training, there is no assurance that they will know how to perform their role or interface with the LERO organization. Cosgrove et al., ff. Tr. 8407, at 4-5; Tr. 8423 (Cosgrove).

237. The Board rejects the argument that the Red Cross and DOE are not aware of their roles under the LILCO Transition Plan or how to perform those roles. Each of those organizations will perform response roles for which they have substantial experience, and each has a letter with LILCO indicating its willingness to perform that role. In addition, this Board finds no reason to require LILCO to exceed the regulations and obtain letters of agreement with schools and other special facilities. These organizations do not provide essential support services and do not require special training to perform their emergency response roles. LILCO will offer training and information sessions to assist those organizations in understanding their role in an emergency, and the Board has no reason to believe that such training would not be accepted.

238. Intervenor's Contention 39.B, which addresses the issue of how LILCO will ensure that non-LILCO support organizations maintain a full complement of trained staff to respond to an incident at Shoreham, raises a number of sub-issues. The Board's findings on analagous issues presented in Contentions 24.S and 98 hold here with respect to the issues of training for schools, special facilities, DOE, and Red Cross. The remaining issues raised by this contention are that agreements with ambulance companies do not mention retraining, that the letter of agreement with the Coast Guard mentions only retraining in personal safety and dosimetry, and that, even if LILCO is notified, LILCO's system will not provide attrition-related staff training until after attrition has resulted in inadequate staffing. Cosgrove (Training), ff. Tr. 13,083, at 87-89.

239. The Coast Guard's letter of agreement with LILCO provides that the Coast Guard will notify persons in the waters of Long Island Sound by marine band radio and direct contact with vessels and that they will provide vessels for radiation monitoring. Plan, at APP-B-8; Tr. 6582-83 (Cordaro). LILCO provides training on radiological monitoring and personnel dosimetry to the Coast Guard; there is no LERO training on marine traffic control or operation of the marine band radio as those are skills the Coast Guard performs as part of its routine duties. Babb et al., ff. Tr. 11,140, Att. 7; Tr. 12,044-45 (Varley). LILCO testified without contradiction that the Coast Guard had already completed initial training and that the Coast Guard's own contingency plan includes a provision that the Coast Guard will notify LILCO if supplemental retraining is required. Tr. 11,471-74 (Daverio), 13,217 (Fakler); Babb et al., ff. Tr. 11,140, Att. 10.

240. Likewise, Intervenors did not contradict LILCO's testimony that ambulance companies are required to provide trained personnel under their contracts. Tr. 6567 (Robinson); Cordaro et al., 4/6/84 Vol. II, Att. 13-21C.

241. In FEMA's opinion, non-LILCO organizations that have indicated their willingness to provide specific response by signing letters of agreement accept the responsibility to inform LILCO of their training needs. Baldwin et al., ff. Tr. 14,151, at 103.

242. The Board holds that LILCO's letters of agreement and the provision in the ambulance company contracts to provide trained personnel constitute continuing obligations that encompass retraining. Likewise, the Board finds that the provision in the Coast Guard's plan that the Coast Guard will notify LILCO of understaffing provides adequate assurance of such

notification. Finally, the Board finds that annually scheduled retraining and LILCO's system of receiving notification of training needs from non-LILCO organizations provide reasonable assurance that non-LILCO organizations will have an adequate number of trained personnel.

B. Attrition With Respect to LILCO Personnel (39.A)

243. Every organization experiences attrition. The witnesses for Suffolk County testified that the LILCO Plan does not compensate effectively for attrition. In their opinion, general quarterly training, semi-annual job-specific training, and annual drills and exercises are too infrequent and do not assure that trained LILCO employees will be available to fill positions in LERO. Cosgrove (Training), ff. Tr. 13,083, at 83-85.

244. The contention also states that LILCO should make satisfactory completion of its emergency response training program a prerequisite to the hiring of personnel who will be assigned response duties. Intervenor did not, however, contradict LILCO's testimony that such a prerequisite would be inappropriate since not all LILCO employees are members of LERO. Babb et al., ff. Tr. 11,140, at 27.

245. LILCO will ensure that an adequate number of trained personnel are available to respond to an emergency by providing annual retraining for previously trained personnel, by training new personnel for the LERO organization to fill those positions affected by attrition, and by overstaffing. Babb et al., ff. Tr. 11,140, at 27; Baldwin et al., ff. Tr. 14,151, at 102; Tr. 14,408-11 (Keller, McIntire).

246. LILCO overstaffs its LERO positions at 150% for jobs that involve the one-time evacuation of the EPZ; this represents staffing for one shift plus reserve personnel. For those LERO jobs that must be staffed throughout the duration of an emergency, LERO is overstaffed to support a 24-hour-a-day, two-shift operation with enough reserve personnel to staff a complete third shift. Babb et al., ff. Tr. 11,140, at 28-29; Tr. 11,421, 11,446 (Daverio); Baldwin et al., ff. Tr. 14,151, at 102; Tr. 14,408-09 (Keller). LILCO is committed to maintaining staffing at 150%. Babb et al., ff. Tr. 11,140, at 29-30; Tr. 11,449 (Daverio).

247. LILCO and FEMA witnesses agree that overstaffing ensures that adequate response personnel will be available. Cordaro et al., ff. Tr. 11,140, at 28; Tr. 14,408-15 (Keller, McIntire, Kowieski). Their testimony was not contradicted by Intervenors.

248. As outlined in the LILCO Plan, classroom training will be scheduled quarterly, and each LERO worker will be expected to complete an entire review program annually. New LERO workers will be scheduled to attend quarterly classroom training sessions at which they will view the LERO training videotapes and complete the associated workbook sections. All LERO workers will also participate in the drill and exercise program, where they will have an opportunity to practice their LERO job skills. The "quarters" concept spreads the material over the course of a year to afford flexible scheduling and to involve LERO workers in LILCO activities throughout the year. The structure of the training program also enables a new LERO worker to complete his initial classroom training in six months. Babb et al., ff. Tr. 11,140, at 31-33; Tr. 14,408 (Keller), Cosgrove (Training), ff. Tr. 13,083,

at 83-84. If the need arises, LILCO can also provide special accelerated training courses to maintain staffing. Plan, at 5.1-8; Babb et al., ff. Tr. 11,140, at 30; Baldwin et al., ff. Tr. 14,151, at 102; Tr. 11,450-52 (Daverio), 11,452-53 (Varley).

249. The rate of attrition at LILCO historically is low. For both 1982 and 1983, the annual attrition rate for LILCO as a whole was less than 5%, including retirements. Babb et al., ff. Tr. 11,140, at 27.

250. In March 1983 LILCO instituted an austerity program, which included laying off a number of LILCO workers who were members of the LERO organization. Training to qualify new employees as LERO members began soon after the layoffs. Replacements have been trained for 124 of the 166 persons who left LERO, either because of austerity or for other reasons, between March 6 and May 30. Babb et al., ff. Tr. 11,140, at 28; Tr. 11,435-37 (Daverio).

251. The Board finds that LILCO's commitment to overstaffing, its proposal to accelerate training for key individuals, and its schedule for providing quarterly training are adequate means for dealing with attrition. The Board further finds that Intervenor's contention that LILCO should make satisfactory completion of its emergency response training program a prerequisite to hiring LILCO personnel is unsupported by the evidence. LERO is a volunteer organization, and membership is not required of all LILCO employees.

C. Job-Related Experience and Stress (40)

252. In Contention 40 Intervenor's state that LILCO personnel will be unable to perform their LERO jobs because their normal daily jobs are

unrelated to their LERO jobs and, as a result, they will not have sufficient experience to perform their LERO responsibilities in the event of an emergency. They further claim that training cannot compensate for this lack of job-related experience, especially when the tasks may be accompanied by high levels of stress and fatigue, and that actual real life experience, therefore, is essential. Finally, Intervenor's argue that LERO workers will not retain what they learned in the LERO training program because LERO workers lack incentive and practice the skills infrequently. Cosgrove (Training), ff. Tr. 13,083, at 17-26, 28-34, 46-55.

253. The County witnesses consider the selection of candidates an essential element of any training program. In their opinion, LILCO's reliance on volunteers to perform emergency duties results in persons with no prior experience filling emergency jobs, no pre-screening of persons who may be unable to learn to perform their emergency jobs, and no prior assessment of whether a particular trainee is potentially ill-suited for emergency work. Cosgrove (Training), ff. Tr. 13,083, at 28-34.

254. In Suffolk County's opinion, an emergency worker has the experience necessary to perform his job only if he comes to the job with experience or if he receives post-training experience. Cosgrove (Training), ff. Tr. 13,083, at 26. Suffolk County's witnesses testified that the only way to learn to perform an emergency response job is through "working at comparable jobs under emergency conditions on a regular basis" and that LERO job skills "can only be learned effectively if, in addition to training, there are regular real life opportunities to actually use those skills." In their opinion "no drill program can fully compensate for the lack of experience that exists

among the LILCO personnel." Cosgrove (Training), ff. Tr. 13,083, at 21, 23, 55; see also Tr. 13,141 (Fakler). However, on cross-examination the witnesses conceded that a drill and exercise program could substitute for experience, but that the LILCO training program was insufficient to accomplish that purpose. Cosgrove (Training), ff. Tr. 13,083, at 55; Tr. 13,144 (Fakler), 13,140 (Cosgrove). The type and magnitude of drill program that Suffolk County's witnesses felt would be appropriate for training LERO personnel would require the tasks to be performed under all possible conditions and was exemplified by the FBI's anti-terrorist training, a continuous one-and-a-half-year program. Tr. 13,140-44 (Cosgrove, Fakler, Lipsky).

255. LILCO witnesses testified that LERO workers' lack of job-related experience does not preclude assurance of an adequate emergency response. It does, however, require that training provide emergency workers with the information and opportunity to know their emergency jobs and how to do them. Babb et al., ff. Tr. 11,140, at 38-40; Tr. 11,478-79, 11,485-86 (Mileti). FEMA agreed with LILCO that training can prepare a person to fill emergency response roles successfully and that job-related experience is not a requirement. Tr. 14,458 (Keller).

256. There are a number of reasons why LILCO employees will be able to adequately perform their assigned emergency functions and duties. First, the drills and exercises give LILCO personnel the opportunity to practice their LERO job under simulated emergency conditions. Second, as covered in the findings on Contention 99, the tasks assigned to LILCO employees are not complex or difficult and do not require daily practice to ensure proficiency. Third, in certain instances the LERO organization has made use of job-related

skills of LILCO employees when assigning them to LERO jobs. Babb et al., ff. Tr. 11,140, at 39-45; Tr. 11,486-88, 11,490-94 (Daverio), 11,499, 11,572, 11,228, 11,242-43 (Varley).

257. The Board finds that prior "real life" experience is not inherently necessary for adequate performance of an emergency job and that lack of experience can be compensated for by a good training program. The LERO training program, which consists of elaborate videotapes and workbooks for classroom use, drills, and exercises, is a complete, well-designed program that provides its participants with an understanding of the tasks necessary to carry out an emergency response for an accident at Shoreham. See Babb et al., ff. Tr. 11,140, at 23-24; Tr. 14,581 (McIntire).

258. Suffolk County's witnesses claim that the stress of an emergency situation will adversely affect the performance of LERO workers. In their opinion the first time an emergency worker is called upon to perform in an actual emergency situation his performance will suffer, and he may either not be able to perform at an acceptable level or flee from his assigned position. Cosgrove (Training), ff. Tr. 13,083, at 20. These witnesses have not studied the behavior of emergency workers in emergency situations and based their testimony solely on their experience in the Suffolk County Police Department. Tr. 13,145-46, 13,150 (Fakler), 13,104, 13,147 (Lipsky), 13,149-50 (Cosgrove).

259. In contrast, Dr. Mileti pointed out that in no instance has an emergency response organization been unable to do its job because its workers were incapacitated by stress and that stress, for example, did not incapacitate TMI workers. Dr. Mileti stated that stress would almost certainly

exist in LERO emergency workers at Shoreham in an emergency, but that it would not incapacitate those emergency workers when their services were needed. In fact, if stress did have an affect on LERO workers, it would probably enhance their ability to meet the demands of the situation. Babb et al., ff. Tr. 11,104, at 47-53; Tr. 11,634-35, 11,663-65 (Mileti), 13,146 (Fakler). Dr. Mileti's opinions were based upon his extensive study of the literature on emergencies and his own observations of emergency workers. Babb et al., ff. Tr. 11,140, at 49-52; Tr. 11,604-11, 11,613-22, 11,630-34, 11,640-49, 11,663-65, 12,066-68, 12,074-76 (Mileti).

260. With respect to the issue of fatigue, studies of emergency workers have found that fatigue does not interfere with people performing emergency work and that they typically work for long hours and step aside only when replaced by other emergency workers. Tr. 11,600-01 (Mileti). Dr. Babb's experience with the Suffolk County Police Department confirms this. Tr. 11,649-50 (Babb). Moreover, those LERO positions staffed throughout the duration of an emergency are manned adequately for shift rotation. See Findings 245-47.

261. FEMA agreed that nonprofessional emergency workers are not rendered ineffective due to stress or fatigue and that realistic drills can prepare an individual to fulfill an emergency response role. Tr. 14,470-74 (McIntire).

262. Contrary to the assertion that LERO personnel will attend LERO training only on an annual basis and that, as a result, the training will be ineffective and forgotten, LILCO has intentionally structured its training program in quarters so that an individual is involved in LERO activities

throughout the course of a year. Finding 248; Babb et al., ff. Tr. 11,140, at 32-34; Tr. 11,458-63 (Varley).

263. The Board concludes, based on the testimony of Dr. Mileti and FEMA, that emergency workers, including LERO workers, would not be incapacitated by stress and fatigue. Although stress and fatigue during an actual emergency might indeed be experienced, such stress or fatigue or a lack of day-to-day related emergency experience will not, in the Board's opinion, significantly reduce the performance level of LERO workers. The Board also believes that LILCO's training and retraining program is adequate to ensure that LERO personnel are in a state of readiness throughout the course of the year.

D. Communications Training (41, 44.D)

264. In Contention 44.D Intervenors complain that the LILCO Transition Plan does not provide for testing whether the content of messages is understood by emergency response personnel.

265. FEMA and LILCO testified that the LILCO Plan adequately provides for quarterly testing of communications with federal agencies and states in the ingestion pathway. Babb et al., ff. Tr. 11,140, at 67-68; Baldwin et al., ff. Tr. 14,151, at 105; Baldwin et al., ff. Tr. 12,174, Att. 1, at 52. LILCO testified that, as part of communication verification drills, communicators will transmit a precompleted message form, and the message received will be checked against the original. Babb et al., ff. Tr. 11,136, at 67-68. In FEMA's opinion, LILCO's use of the Radiological Emergency Data Form, which is the standard New York State form that has been used successfully at other reactor sites, indicates that the federal agencies and New York State will

understand the content of the message. Baldwin et al., ff. Tr. 14,151, at 106; Tr. 14,488-90 (Keller, Baldwin). Intervenors offered no evidence to contradict the testimony of FEMA and LILCO that LILCO's provisions for testing of the content of messages are adequate.

266. Therefore, the Board finds that the provisions of the LILCO Transition Plan for quarterly testing of communications (including the content of messages) with federal agencies and states within the ingestion pathway are adequate.

267. In Contention 41 Intervenors complain generally that there is no assurance LERO workers will be adequately trained in the use of communications equipment to be able to use it effectively in an emergency. They allege specifically, but largely without support in testimony, that communications training must include instruction in the proper use of radio frequencies, the range of coverage available for each frequency, and proper radio discipline; they also complain that the LILCO Plan gives no indication of the scope or content of the communications drills or exercises.

268. According to Suffolk County's witnesses the inexperience of LERO workers in using communications equipment during an emergency will prevent them from operating the equipment effectively under the stress of emergency conditions. Further, the County's witnesses opined that any radio experience LERO workers might have in non-emergency situations is irrelevant and that the LILCO training program, which the County alleges is primarily classroom training with almost no "hands-on" experience, does not overcome the lack of experience in operating communications equipment in an emergency. Suffolk County's witnesses believe that communications training

should prepare LERO workers for high levels of anxiety, including heavy radio traffic and overlapping transmissions. Cosgrove (Training), ff. Tr. 13,083, at 72-73, 77-78; Tr. 13,407 (Cosgrove).

269. Suffolk County's testimony is based on the erroneous presumption that communications traffic during an emergency at Shoreham will be heavy and comparable to the radio traffic experienced by the SCPD in other emergencies. In reality LERO communications are administrative rather than operational and, as a result, the number of radio transmissions is limited. Compare Tr. 11,727-29 (Renz) with Tr. 13,216-17, 13,407 (Fakler); see Findings 203-06.

270. Another reason LERO personnel will be able to use the communications equipment effectively is that the equipment, which consists of radios and telephones, is simple to use. Babb et al., ff. Tr. 11,136, at 58-60. LILCO's witnesses testified from personal experience that LERO workers practice using the equipment during drills and exercises. Tr. 11,729-31, 11,741-42 (Renz); Babb et al., ff. Tr. 14,140, at 61, 64-65. These witnesses had observed that during numerous drills LERO personnel and equipment had fulfilled the intended objectives of the communications link exercised. Babb et al., ff. Tr. 11,136, at 65; Tr. 11,763-66 (Renz, Varley). Despite isolated problems during the drills and exercises, LILCO employees have not had a problem learning how to use the mobile radios. Tr. 11,575-78 (Varley).

271. Both the FEMA and LILCO witnesses testified that stress does not incapacitate emergency workers and, therefore, that stress would not impair the use of communications equipment. Findings 258-61, 263. Moreover, the County witnesses themselves conceded that stress produced by an emergency

situation, and problems with operating communications equipment that might result from that stress, probably would occur with any group, including police officers. Tr. 13,215, 13,406 (Cosgrove).

272. Both FEMA and LILCO testified that adequate training in the use of communications equipment is provided. They disagreed with the statement in the contention, which was not supported by County testimony, that training on the range of coverage for each frequency is necessary. Baldwin et al., ff. Tr. 14,151, at 105; Tr. 14,477-78, 14,484 (Keller); Babb et al., ff. Tr. 11,140, at 64-65; Tr. 11,768-72 (Renz). FEMA believed that training in radio discipline would be desirable, Tr. 14,487 (Keller). LERO workers are taught radio discipline in Module 8A, Babb et al., ff. Tr. 11,140, Att. 16; Tr. 11,749-54 (Varley, Renz).

273. As the Board found with respect to Contention 40, stress will not impair the ability of LERO workers in an emergency. Indeed, there is credible evidence that stress may enhance performance. See Tr. 11,634-35, 11,663-65 (Mileti). Consequently, the Board concludes that the stress of an emergency will not hamper the ability of LERO workers to use the communications equipment and agrees with FEMA and LILCO that LILCO's program provides adequate training in the use of the equipment. Suffolk County's assertion in the contention that training must include instruction in the use of radio frequencies and the range of coverage is unsupported by the evidence. The ability of LERO workers to actually use the communications equipment will be tested under simulated emergency conditions during a FEMA exercise.

E. Free Play for Decisionmaking (44.E)

274. Intervenors' Contention 44.E states that "the plan fails to describe how exercises and drills are to be carried out to allow free play for decisionmaking." See Contention 44.E.

275. The term "free play for decisionmaking" describes the instructional method used in an exercise whereby the participants collect, analyze, and diagnose accident symptoms and develop response action decisions. Babb et al., ff. Tr. 11,140, at 69. Allowing for free play for decisionmaking in drills and exercises is a requirement of NUREG-0654. Babb et al., ff. Tr. 11,140, at 69; Tr. 14,496 (Keller).

276. The LILCO Transition Plan provides for free play for decisionmaking when it states that drill and exercise scenarios will include "scenario initiating events which allows for participant discretion and decision-making." LILCO Plan at 5.2.2; Tr. 14,500 (Keller). A more detailed description of how free play for decisionmaking is to be carried out in drills and exercises need not be included. Tr. 14,493-94, 14,500 (Keller). Exactly how free play will be carried out depends upon the objectives of each drill or exercise. Baldwin et al., ff. Tr. 14,151, at 106-07; Tr. 14,500-01 (Keller). Both FEMA and LILCO witnesses agree that free play for decisionmaking is adequately addressed in the LILCO Plan and procedures. Tr. 14,493-95, 14,500-01 (Keller); Babb et al., ff. Tr. 11,140, at 69-70.

277. Both LERO drills and exercises are structured to simulate actual emergencies, and free play for decisionmaking is inherent in the manner in which they are conducted. Drill participants do not know the time frames or accident scenario prior to the drill. Babb et al., ff. Tr. 11,140, at 71-72;

Tr. 11,807 (Daverio). LERO workers receive information in much the same manner as the information would be available to them in an actual emergency via the various emergency communications circuits, must make decisions based on that information, and carry out the course of action that they have developed using the procedures and equipment that they would use in an emergency. Babb et al., ff. 11,140, at 40-42, 71; Tr. 14,500 (Keller). "Sub-situations" present participants with additional problems or distractions of the type that might occur in a real emergency, and they must develop on-the-spot responses. Babb et al., ff. Tr. 11,140, at 42. FEMA believes that such realism in the drill and exercise program provides for the free play aspect of decisionmaking. Tr. 14,491-92 (Kowieski).

278. The County's position that free play is lacking in the LERO drills is apparently based on its assumption that free play in decisionmaking must be experienced by field workers such as traffic guides who, in Suffolk County's opinion, are likely to experience no less serious unscheduled occurrences than high-level decisionmakers. The County witnesses opined that free play for decisionmaking was absent from LILCO's drills because the subsituations used to simulate emergency conditions are not equivalent, in their view, to the hurly-burly of real-life situations. Tr. 13,306-07 (Lipsky).

279. It is important for free play for decisionmaking to occur within LERO and to have other LERO members respond as a result of that decisionmaking process. Tr. 11,800-01 (Daverio), 14,509 (McIntire). Drills are structured to encourage such free play. See, e.g., Babb et al., ff. Tr. 11,140, at 40-41; Tr. 11,800-01 (Daverio). Free play for decisionmaking, where possible, is desirable for all levels of personnel; however, at lower

levels in the organizational structure, many of the functions are covered by procedure and there is less room for decisionmaking to occur. Tr. 14,507-08 (McIntire, Keller); 11,798-800 (Daverio). Managerial levels of LERO, as well as positions in the field such as transfer point coordinators and route alert drivers, do engage in free play for decisionmaking in drills. Tr. 11,795-802 (Daverio).

280. The LILCO Plan also makes provisions for FEMA and the NRC to review the objectives and the scenario for the FEMA graded exercise. See Plan, at 5.2.2; Tr. 14,501 (Baldwin). FEMA reviews the scenario and specifically ensures that free play is included. Tr. 14,496-97 (Kowieski).

281. The Board finds that the LILCO Plan adequately addresses the NUREG-0654 requirement of allowing for freeplay for decisionmaking in drills and exercises. The Board also finds that allowing for participant discretion and decisionmaking in LILCO's exercise and drill scenarios will allow free play for decisionmaking to be carried out.

F. Official Observers and Critiques (44.F)

282. The Intervenor's argue that even though the LILCO Plan provides that the federal, state, and local governments will be invited to evaluate and critique annual exercises, such governments have not agreed to send official observers to LILCO's annual exercise, and, therefore, there is no assurance that observers will be provided. The Board can find no reason to believe that government officials, when extended the invitation to observe LILCO's annual exercise, will refuse. See Tr. 11,834-36 (Daverio), 11,384, 12,054-55 (Cordaro).

283. The contention also alleges that LILCO lacks expertise and objectivity, and therefore that LILCO will not be able to critique adequately its own drills and exercises or to take the necessary actions to correct deficiencies in the plan and procedures. Intervenors presented no testimony to support Contention 44.F, and their position is contradicted by Suffolk County's own supplemental testimony, which quotes passages from completed critique forms. The critiques negate any contention that LILCO cannot objectively critique its own drills. See Cosgrove (Supplemental), ff. Tr. 13,083. Moreover, LILCO's witnesses testified that LILCO has established a control system to ensure that critical comments are considered and resolved. Tr. 5686 (Weismantle). In fact, the LILCO witnesses testified that many deficiencies discovered in early drills were corrected. Tr. 5687-90, 5701, 5710-12 (Weismantle), 5871-72 (Renz), 5880-82 (Renz, Daverio), 5966-67 (Daverio), 7073-75 (Varley).

284. The Board recognizes that it is common practice for utilities and offsite organizations to observe and critique their own exercises using their own and supplemental personnel, and that the best way for LILCO to prepare for a FEMA graded exercise is to carry out and critique drills in the manner in which they will be critiqued during the exercise. See Babb et al., ff. Tr. 11,140, at 75; Tr. 14,514 (Keller). In fact, FEMA looks at a utility's internal drill program as preparation for the federally evaluated exercise. See Tr. 6072, 14,515 (Keller). The Board concludes that LILCO, like other utilities, is equipped to objectively critique its own drills and exercises (this has been borne out in the critiques already conducted by LILCO) and that the LILCO Transition Plan adequately provides for evaluation and critiques of LILCO

drills and exercises as well as the annual exercise. See Tr. 14,514 (Keller); Baldwin et al., ff. Tr. 14,157, at 107.

G. LILCO's Classroom Training Program (99)

285. In Contention 99 Intervenor's allege that the instructors in the classroom phase of the training program are not experts in the subjects covered or trained and not experienced in teaching methods. Second, Intervenor's assert that the classroom materials provide insufficient information on how each LERO member is to perform the specific duties assigned to him, but concentrate instead on descriptions of the duties and chains of command.

Contention 99.C

286. The County's witnesses opined that LILCO personnel will not learn enough in the classroom sessions to enable them to perform their emergency roles because most of LILCO's classroom instructors are not knowledgeable about the material being presented. Cosgrove (Training), ff. Tr. 13,083, at 37-40. On cross-examination Suffolk County's witnesses revised their opinion that "it is unlikely that a LILCO instructor who had never performed a particular job . . . could teach someone else how to perform that job" to the more realistic view that it would not be impossible for someone to teach a subject effectively without prior on-the-job experience but that such experience would enhance the instruction. Tr. 13,179-80 (Lipsky).

287. In the LERO classroom sessions, the instructor is present to ensure that the students view the videotape, review the material in the workbook, and work through the self-check exercise contained in the workbook. The instructor is available, throughout the classroom session, to answer questions, and, upon the class's completion of the self-check exercise, the

instructor conducts a question-by-question review of the material. Babb et al., ff. Tr. 11,140, at 16-17; Tr. 11,222-24, 11,299-306, 11,310 (Varley), 11,263-65 (Berger, Varley); 14,396-97 (Keller). One of the advantages of videotapes is the ability to present the LERO training material without the need for instructors with extensive subject matter expertise or teaching background. Babb et al., ff. Tr. 11,140, at 89-90; Tr. 11,919 (Varley). The videotapes and workbooks provide the "expert" presentation of the information, with the instructors providing control and guidance in the classroom setting. Babb et al., ff. Tr. 11,140, at 20, 87-88; Tr. 11,902-03 (Varley).

288. The scripts and workbooks were prepared by individuals who had expertise in the subject area of the plan and procedures that were to be converted into training materials. Tr. 11,924, 11,929-31 (Varley); Babb et al., ff. Tr. 11,140, at 89-90. They were reviewed by a number of individuals experienced in developing training programs, including Dr. Mileti and Mr. Berger, for accuracy and consistency and to determine whether they were sufficient to impart the knowledge necessary for each LERO position. Tr. 11,165-66 (Berger, Mileti), 11,929-31 (Varley, Daverio).

289. In FEMA's opinion the expertise of the instructors in the subject matter or teaching technique is immaterial so long as the result of the training program is that the emergency worker is trained to carry out his assigned tasks adequately. The ability of LERO personnel to perform their LERO job will be evaluated in a FEMA exercise. Baldwin et al., ff. Tr. 14,151, at 109; Tr. 14,528-29 (Keller).

290. The County witnesses also questioned the adequacy of the pre-classroom instructor preparation process. Cosgrove (Training), ff. Tr. 13,083, at 38, 40. LILCO witnesses testified that all instructors reviewed the videotape, workbook, relevant portions of the plan and procedures, and other material to be presented; were quizzed in a question-and-answer session on their knowledge of the material; and were certified to be qualified to conduct the training sessions to which they were assigned. Babb et al., ff. Tr. 11,140, at 88; Tr. 11,889-92, 11,895-902, 11,920-23 (Varley), 11,866-88 (Daverio). To further ensure that proper information was provided to the students, the instructors were given, and used on a number of occasions, a telephone contact at LERIO where they could obtain additional information if a question arose that they could not answer. Tr. 11,358-59, 11,263-66 (Berger, Varley). In addition, classroom sessions were intermittently monitored by LILCO and by Impell training personnel to verify there was an adequate training process occurring. Tr. 11,204-07 (Varley, Daverio), 11,903-06 (Varley).

291. The Board finds, based on the use of the LERO videotapes and workbooks as the primary instructional tools for the classroom portion of the training program, that there is no need to require LERO instructors to have extensive subject matter expertise or previous teaching experience beyond the classroom preparation described by the LILCO witnesses in order for those instructors to carry out an effective classroom presentation.

Contention 99.G

292. Suffolk County witnesses testified that LILCO's training materials do not contain sufficient information to teach workers how to perform their

jobs. This opinion appears to be based in part on the misconception that an individual should possess all the skills to perform his LERO responsibilities after attending only the classroom portion of the program. Cosgrove (Training), ff. Tr. 13,083, at 36-37, 39-40. Suffolk County witnesses also contend that the jobs assigned to LERO workers are complex and difficult. Cosgrove (Training), ff. Tr. 13,083, at 17, 18, 26, 36, and 41; Tr. 13,203-04 (Fakler).

293. As pointed out by LILCO's witnesses, the LERO training program does provide job-specific training to LERO trainees. The LERO training program is in three steps. First, the classroom sessions where the LERO trainees receive basic information about LERO and about the nature of their jobs. Second the drill program, which provides the trainee with the opportunity to practice his emergency job and gain the necessary skills and experience. Babb et al., ff. Tr. 11,140, at 92-93. Trainees also gain "hands-on" practical experience in the performance of LERO jobs in the classroom through equipment demonstrations and during in-the-field sessions for traffic guide and bus driver training. Third, during drills and exercises trainees are required to carry out their LERO jobs in a simulated emergency condition without assistance from exercise controllers. Babb et al., ff. Tr. 11,140, at 13, 21-22.

294. The classroom training sessions were designed to give the participants an awareness of the emergency plan, the implementing procedures, and the job responsibilities outlined in the program. The classroom sessions are not the termination point of the training program; LERO personnel are not expected to perform their jobs until they have completed the classroom

sessions identified on Figure 5.1.1 of the Plan and the drills identified on Figure 5.2.1. . . Babb et al., ff. Tr. 11,140, at 92, 99-100; Tr. 11,227, 11,269 (Varley), 11,229-30, 11,943-44, 12,006-07 (Daverio), 11,298-99 (Berger).

295. FEMA agrees with LILCO that the LILCO Plan and the training program for LERO contain adequate information for personnel to be able to carry out their emergency functions; and FEMA will also evaluate the ability of LERO personnel to perform their job functions at a federally observed exercise. Baldwin et al., ff. Tr. 14,142, at 109; Babb et al., ff. Tr. 11,140, at 25.

296. Suffolk County's testimony that LERO tasks are complex and difficult is based both on the perception of the County's witnesses that LERO personnel will be required to interact with an hysterical public and on an ignorance of the complexity of the skills that must be learned. Tr. 13,119-20, 13,170-78 (Lipsky), 13,325-28 (Lipsky, Cosgrove, Fakler). For example, Professor Lipsky was unable to describe the "complicated routines" he claimed decontamination workers must learn. Tr. 13,170-76 (Lipsky). Indeed, Professor Lipsky conceded that he did not separate the jobs skill from the situation and, in his opinion, even the simplest tasks would become very complicated in a radiological emergency. Tr. 13,177 (Lipsky); see also Tr. 13,325-28 (Lipsky, Cosgrove, Fakler).

297. The testimony of the Suffolk County witnesses on the behavior of the public in an emergency is not persuasive. Not one of the witnesses has studied the response of the public to a large-scale emergency; their testimony was based largely on the personal experience of the Suffolk County police. Tr. 13,104, 13,147 (Lipsky), 13,148-50 (Cosgrove), 13,145-46, 13,150 (Fakler).

298. Both LILCO and FEMA witnesses agree that the emergency response tasks assigned to individual LILCO employees (for example, traffic guidance and monitoring and decontamination) are generally not complex or difficult and do not require daily practice to ensure proficiency. Baldwin et al., ff. Tr. 14,151, at 104; Babb et al., ff. Tr. 11,140, at 39-40; Tr. 11,572 (Varley), 14,457-62 (Baldwin, Keller, McIntire). In the few isolated instances where LERO tasks require a more substantial capability to perform LILCO has taken measures to ensure that the appropriate individuals are obtained to fill those positions, such as the Radiation Health Coordinator position and the command and control positions within LERO. Tr. 11,486-87 (Daverio); see also Tr. 14,593-94 (Keller).

299. The Board finds that the classroom materials provided to the LERO trainees are consistent with the three-part training program and contain enough detail to enable LERO personnel to carry out their assigned responsibilities when the classroom sessions are combined with the drill program. The Board finds that most LERO jobs are not complex or difficult to carry out and that LILCO has identified and filled those few LERO positions that require persons with additional knowledge and capabilities with competent and capable individuals. Furthermore, the Board agrees with FEMA and LILCO that the final test of the LERO training program will be the FEMA exercise. Baldwin et al., ff. Tr. 14,151, at 109; Tr. 14,528-29; Babb et al., ff. Tr. 11,140, at 25.

H. LILCO's Drill and Exercise Program (100)

300. Intervenors claim LILCO's drill and exercise program is inadequate to prepare LERO personnel for their LERO jobs because not all LERO

field personnel are accompanied to their posts by instructors at every drill. They further complain that not every aspect of each LERO job is exercised during each drill and that the drills contain no terminal performance standards to evaluate the performance of individual trainees.

Contention 100.B

301. The County's witnesses asserted that LILCO's drills are of little value because instructors do not accompany each field worker to his post; they incorrectly assume that observers are positioned only at the EOC and the staging areas. Cosgrove et al., ff. Tr. 13,083, at 58-59.

302. LILCO's witnesses testified that controllers do accompany trainees to field positions other than the EOC and staging areas during the drills to observe and provide instruction to the drill participants. Due to the sheer number of people deployed in the field,^{80/} it is virtually impossible to accompany each person to his final field destination. Instead, controllers are positioned in key areas to monitor response actions of the field personnel at those locations and to monitor the feedback from drill participants at remote locations. In addition, trainees sent into the field were asked to complete forms detailing their field activities; these provided another means of monitoring field activities. Babb et al., ff. Tr. 11,140, at 103-04; Tr. 11,229 (Varley); 11,233-35, 12,022-25 (Daverio).

^{80/} There are 647 individuals deployed into the field solely to fill the positions of traffic guides, bus drivers, transfer point coordinators, road crews, route spotters, and route alert drivers. See LILCO Plan, Fig. 2.1.1, at 3 of 4.

303. Although traffic guides and bus drivers are not accompanied to their posts at every drill, they receive supervised "in-the-field" training for aspects of their jobs that could not be exercised during the drills without impacting the public. LERO bus drivers participated in a bus driver training and licensing program that provided them with actual "on the road" experience driving buses in the presence of an instructor. Babb et al., ff. Tr. 11,140 at 104; Tr. 11,229-30, 11,272 (Daverio). Bus drivers' licensing and relicensing by the New York State Department of Motor Vehicles on a periodic basis give them the skills and experience necessary to drive a bus. In addition, LILCO fully intends to have the bus drivers drive buses during the FEMA graded exercise. Tr. 11,229-30, 11,233, 11,931-32, 12,034-35 (Daverio). LERO traffic guides attend "in-the-field" classroom training on traffic guidance. During that training, LERO traffic guides are given 10 hours of training designed to qualify them to direct traffic. They direct actual traffic through intersections in a simulated environment under the supervision of an instructor; emergency conditions, such as the approach of an emergency vehicle, are simulated. Babb et al., ff. Tr. 11,140, at 96-98, 104-05, Att. 22, 23-24; Tr. 11,996-97, 12,001-03 (Babb), 11,229-30 (Varley).

304. The Board agrees with FEMA and LILCO that it is not necessary for each individual to be accompanied by a supervisor during all phases of the drill, and that it is adequate for important functional aspects of the response to be evaluated by observers. Tr. 14,541 (Keller), 11,228-29, 11,235 (Varley). The Board also finds LILCO has developed other methods that are adequate to train and critique LERO field workers.

Contention 100.D

305. The County's witnesses claim it is impossible for LERO trainees to learn their jobs in drill situations because during the drills many trainees do not practice the skills they will perform during an emergency. Cosgrove (Training), ff Tr. 13,083, at 57. They take the unrealistic position that drills must be performed "in a realistic environment under real conditions . . . all conditions." Tr. 13,141 (Fakler).

306. LERO trainees are provided with opportunities to practice their job skills under simulated emergency conditions during drills. Tr. 11,228 (Varley). These opportunities are realistic and are carried out within the realm of what is practical. For example, it is not practical for a traffic guide, once he arrives at his assigned intersection in a training exercise under normal, non-emergency conditions, to direct traffic, since it would impact the public. Nor is it practical, both because of cost and the relatively small incremental benefit to be gained, for a bus driver in a training exercise to drive a rented bus, rather than a private vehicle, using the route map that he would use in a real emergency. Tr. 11,242-44 (Varley), 11,362-64 (Daverio, Varley). As described in the decision on Contention 100.B, above, LILCO does provide traffic guides with the opportunity to direct traffic during the elaborate traffic guide "in-field" training sessions, and bus drivers with the opportunity to drive buses during a training and licensing program.

307. FEMA takes the position that LILCO need not have LERO workers perform all aspects of their LERO jobs during drills. However, FEMA will require buses to be driven as part of the FEMA graded exercise. Tr. 14,552-54 (Kowieski), 14,554-55 (McIntire).

308. The Board finds that other than the few instances, such as those mentioned above, where field personnel cannot carry out all their activities, LERO personnel do have the opportunity to carry out their full range of activities while participating in the LERO drills. Suffolk County's position that all LERO participants should be required to exercise all of their responsibilities during a drill is impractical and beyond realistic expectations for an emergency preparedness training program. See Babb et al., ff. Tr. 11,140, at 40-42; Tr. 11,228, 11,372-74, 11,242-44, 11,570-71, 11,579-80 (Varley), 11,673-78 (Daverio, Varley), 11,364, 11,766, 11,795, 11,866-70 (Daverio), 12,060-62 (Daverio, Cordaro).

Contention 100.G

309. Suffolk County's witnesses have erroneously asserted that there are no criteria used in evaluating the performance of individuals during LERO drills. See Cosgrove (Training), ff. Tr. 13,083, at 59. The minimal testimony on the issue submitted by Suffolk County on this issue is not persuasive and does not warrant a finding that evaluation of LERO personnel during drills is inadequate.

310. LILCO's witnesses testified that LERO drills are not the termination of training and, therefore, they are not the point at which terminal performance behavior should be evaluated. Consequently, the LERO drills do not contain written terminal performance behavior standards for each of the drill participants. Tr. 12,037 (Daverio). However, critiques of the drill participants are an integral part of the LERO drills. Part of the drill scenarios are drill evaluation forms that include objective and observable criteria with which to evaluate the performance of LERO and its trainees. Tr. 12,039

(Daverio), 12,037 (Varley); see Drill Evaluation Sheets, Babb et al., ff. Tr. 11,140, Att. 1, at 7-4 to 7-8; Att. 3, at 15-19; Att. 6, at VII-4 to VII-8; Att. 1, at 7-4 to 7-8; Att. 3, at 15-19; Att. 6 at VII-4 to VII-8. These critiques are aimed at increasing the proficiency with which LERO workers perform their job skills and ultimately to achieve the goals of the terminal performance behavior. Babb et al., ff. Tr. 11,140, at 108; Tr. 11,378-82 (Varley). The terminal performance behavior for LERO and the objective of the LERO training program is to demonstrate the ability of the LERO organization to function as an emergency response organization in the FEMA graded exercise. Babb et al., ff. Tr. 11,140, at 107-08; Tr. 12,037 (Daverio). In the FEMA graded exercise LERO workers will be called upon to perform the job skills they have learned in the training program and to carry out those responsibilities in a simulated emergency environment. LERO will be evaluated by impartial federal agencies, FEMA and the NRC. Babb et al., ff. Tr. 11,140, at 25.

311. The FEMA witnesses testified that the exercise objectives, which are part of any FEMA graded exercise, constitute a standard of performance against which the adequacy of LERO will be assessed. The FEMA post-exercise assessment will provide an indication of the adequacy of the LERO training programs as well as of the ability of the LERO organization to perform its emergency response function. Baldwin et al., ff. Tr. 14,151, at 111; Tr. 14,556-58 (Keller).

312. The Board will not require LILCO to institute terminal performance standards as part of its drill program. As LILCO has stated, the FEMA evaluated exercise will provide sufficient determination of the

capabilities of LERO to carry out its emergency response role. Moreover, the Board finds that the LILCO drill and exercise program does include provisions for evaluating LILCO trainees against objective, observable criteria.

G. Supplemental Testimony^{81/}

313. Suffolk County Police Officers Cosgrove and Fakler submitted supplemental testimony that purports to be an analysis of critique forms completed by observers and controllers at LILCO drills. See Cosgrove (Supplemental), ff. Tr. 13,083. The County witnesses stated that the purpose of the analysis was to see whether there were any patterns that were consistent with earlier hypotheses anticipated from the witnesses' review of the training materials. Tr. 13,427-33 (Lipsky), 13,240-41, 13,433-34 (Cosgrove). The forms that were analyzed contained both numerical ratings and narrative comments; however, the analysis did not consider any of the information contained in the numerical rating portion of the form, Tr. 13,232, 13,234, 13,239-40, 13,245 (Cosgrove), 13,470 (Lichtenfels), nor any of the positive written comments, Tr. 13,244 (Cosgrove). Moreover, there was no attempt to make any comparison between the positive and negative comments or ratings or to look for any improvements in the frequency of positive ratings. Tr. 13,243-45 (Cosgrove). Despite their limited analysis of the data, Suffolk County witnesses drew the broad conclusion that "the LILCO training program has failed to recognize and deal adequately with problems" and that the

^{81/} Supplemental testimony on Contentions 39-41, 44, and 98-100 was filed by Deputy Inspector Peter F. Cosgrove and Lieutenant John L. Fakler. Michael Lipsky also testified with the Suffolk County Panel on the Supplemental Training Testimony. LILCO presented oral rebuttal testimony through Philip A. Lichtenfels.

analysis "indicate[s] significant problems with LILCO's training program." Cosgrove (Supplemental), ff. Tr. 13,083, at 20.

314. LILCO presented oral rebuttal testimony through Philip Lichtenfels. In Mr. Lichtenfel's opinion, patterns could not be established by an analysis of the narrative comments alone both because of the small data base and the flawed research design. Tr. 15,514 (Lichtenfels). He further opined that the conclusions reached in the supplemental testimony were not supported by the methodology employed in analyzing the data base. Tr. 13,478-79 (Lichtenfels).

315. The Board finds that the Suffolk County witnesses employed a faulty methodology in their review of the data and consequently did not conduct the kind of careful, systematic review that would produce a reliable, probative analysis. Tr. 13,478-79, 15,514 (Lichtenfels). The rejection of available information in the rating portion of the forms, the majority of which apparently provided useful information, renders the conclusions of the analysis questionable. See Tr. 13,501, 13,504-10, 13,495-96, 13,470-72, 13,476-77, 13,526-27 (Lichtenfels). Indeed rejection of a large portion of the data compounds the problems raised by the County's analytical approach of searching for comments confirmatory of initial hypotheses held by the witnesses. By failing to consider possible contradictory evidence in the ratings or positive written comments, the witnesses did not employ the fundamental research approach of systematic hypothesis testing. Tr. 13,475 (Lichtenfels). Moreover, indications that the written comments relied on by the Suffolk County witnesses may have been negatively biased by the request on the critique forms for written justification of low ratings, further impeach

the reliability of the analysis. See Tr. 13,471-72, 13,512-23 (Lichtenfels). Ultimately, even if the Board were to accept the County's analysis, it cannot draw any inferences about the LILCO training program as a whole from the analysis. The data base is not susceptible to such broad inferences. Tr. 13,476-78 (Lichtenfels), 13,444-45 (Lipsky).

VI. NOTIFICATION AND INFORMATION TO PUBLIC

A. Notification (24.T, 55-59)^{82/}

316. In Contentions 20 and 55-59, Intervenors question LILCO's ability to provide prompt notification to the public.

Delays in Activating the Sirens (55)

317. Suffolk County's witnesses testified that LILCO's siren system will not provide timely notification to the public both because delayed notification of command and control personnel will delay the decision to activate the siren system and because a number of actions must be taken prior to activating the sirens. The County testified that notification will be untimely because the public will not receive notification and information within 15 minutes, but did not demonstrate a clear understanding of the point in time at which the 15 minute period began. Regensburg et al., ff. Tr. 5416, at 4, 6-8; Tr. 5429-35 (Snow).

318. As the witnesses for LILCO and FEMA testified and the findings on Contention 26 demonstrate, key command and control personnel will be notified promptly and the sirens will be activated in a timely manner. In a

^{82/} New York State presented no evidence in support of these Contentions.

General Emergency with protective action recommendations, the Customer Service Operator will activate the prompt notification system by procedure when the Director of Local Response cannot be reached within 10 minutes.

Cordaro et al., ff. Tr. 4842, at 8-9; Tr. 12,684-85 (Keller), 12,687 (Kowieski), 4423-25 (Daverio, Renz), 4877-79 (Renz); see Findings 158-174.

The regulations do not mandate that the prompt notification system be activated prior to a General Emergency. Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-82-70, 16 NRC 756, 774, 814-15 (1982).

319. The Board agrees with LILCO and FEMA that the LILCO Plan adequately provides for prompt notification and mobilization of key command and control personnel which permits the prompt notification system to be activated in a timely fashion and that adequate provisions exist to ensure activation of the prompt notification system in a General Emergency with protective action recommendations even if command and control personnel cannot be reached.

320. The County's witnesses also testified that even if command and control personnel receive timely notification, the Director of Local Response will be unable to complete all the steps required for activation of the prompt notification system within 15 minutes. Regensburg et al., ff. Tr. 5416, at 6-8. Moreover, the County witnesses stated that additional delay in siren activation is likely because the siren system must be activated simultaneously with the broadcast of an EBS message over WALK radio and it is unrealistic to assume that an EBS message can be prepared and transmitted to WALK within 15 minutes. Regensburg et al., ff. Tr. 5416, at 9-12.

321. LILCO's witnesses testified that the Plan does not require that the Director of Local Response unalterably follow, in order, each step in the procedure for activation of the prompt notification system. Rather, the procedures provide guidance to the Director and a number of the steps in the procedure are not necessary to the activation of the prompt notification system. Tr. 4859, 4861-67, 4870 (Renz); OPIP 3.1.1.

322. Both FEMA and LILCO testified that, while coordinated activation of the siren and the EBS message on WALK radio is a requirement of the LILCO Plan, simultaneous activation is not. Tr. 12,689 (Keller), 4870-71 (Renz).

323. The coordinated activation of the Emergency Broadcast System will not delay the activation of the sirens. In drafting an EBS message the Coordinator of Public Information or, in his absence, the Director of Local Response will make use of one of the sample EBS messages and a combination of information from the Radiological Data Form (used by all offsite authorities in New York State), offsite radiological assessment data, and meteorological conditions. Tr. 4936-40 (Renz, Weismantle). In the case of a General Emergency with protective action recommendations, if the Customer Service Operator contacts WALK, he will use Message A, which does not require any supplemental information. Tr. 4933-36 (Renz).

324. The Board finds LILCO's testimony on the steps required to activate the prompt notification system persuasive and supported by the testimony of FEMA. Neither the LILCO procedures nor common sense would dictate rigid adherence to all steps of a procedure prior to activation of the prompt notification system. In addition, the Board finds that activation of the EBS

should be coordinated with activation of the sirens and that the procedures for coordinated activation will not delay notification to the public.

Backup to the LILCO Siren System (56)

325. The County's witnesses testified that LILCO's provisions for backup to the sirens are inadequate. Specifically, they stated that the sirens have no backup power source and that route alert drivers are an inadequate backup to the siren system because the identification of failed sirens, the mobilization of route alert drivers, and the time it would take to drive through failed siren area will take too long and, therefore, the route alert drivers will not provide notification to the public within 15 minutes. Regensburg et al., ff. Tr. 5416, at 13, 20-22; Tr. 5453-54 (Snow).

326. The regulations and guidelines that outline the requirements for notification of the public do not even require that a backup notification method be available. Kansas Gas & Elec. Co. (Wolf Creek Generating Station, Unit No. 1), ASLBP-81-453-03 OL, slip op. at 19, 67 (July 2, 1984); see also Cordaro et al., ff. Tr. 4842, at 14-15; Tr. 5012 (Renz). Since the Prompt Notification System, as designed (the sirens, tone alert radios, and Emergency Broadcast System), has the capability to complete initial notification within about 15 minutes, the LILCO Transition Plan complies with the regulations and guidelines for prompt notification of the public. See Cordaro et al., ff. Tr. 4842 at 12; Tr. 5005, 5015 (Hobbs).

327. The LILCO Plan does provide for a backup should any siren fail to operate in an emergency. First, as the findings on Contention 95 show, there are no regulatory requirements that prompt alerting systems have backup power sources, Metropolitan Edison Co. (Three Mile Island Nuclear

Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1542 (1981); however, LILCO will restore power to the siren system on a priority basis. Finding 697. Second, route alert drivers will be used to provide backup notification in areas where it has been determined, by telephone survey and review of electric circuits, that a siren has failed. Cordaro et al., ff. Tr. 4842, at 13; Tr. 4959-61, 4964-65 (Schiffmacher), 4979 (Renz).

328. LILCO testified that LILCO's Customer Service office in Riverhead, which monitors the electric circuits for the siren area, will know almost immediately if sirens fail due to loss of power to the circuit. Tr. 4959-61, 4964-65 (Schiffmacher), 4979, 4993-94 (Renz); Cordaro et al., ff. Tr. 4842, at 13. Marketing Evaluations, a professional polling company, estimated that it will take 90 minutes under emergency conditions to complete a telephone survey verifying that all the sirens have sounded. Tr. 4979-80 (Renz, Weismantle), 4983-89 (Weismantle); Regensburg et al., ff. Tr. 5416, at 14-15; Cordaro et al., ff. Tr. 4842, at 13. After the failed sirens have been identified, route alert drivers are dispatched from the staging areas to drive their routes while broadcasting a pre-recorded message over a loud speaker system attached to their vehicles. Maps are provided to route alert drivers to assist them in finding and driving their route and drills have confirmed that the maps are satisfactory. Tr. 5687-90, 5699-703 (Weismantle). More than one route alert driver can be dispatched to cover a route, which is the area covered by one siren. Tr. 5039-40, 5157-59 (Renz, Weismantle). The LILCO Plan also provides that route alert drivers mobilize at the Alert level; this permits pre-positioning at the staging areas and ensures a rapid response in the more likely slow-breaking accident. Cordaro et al., ff. Tr. 4842, at

13-14; Tr. 4218 (Cordaro). LILCO's witnesses testified that the route alert driver procedure is a detailed, workable one that is similar to procedures in use at other sites including Indian Point. Cordaro et al., ff. Tr. 4842, at 13; Tr. 4994-95 (Renz), 5004-05 (Hobbs); see Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), LBP-84-37, slip op. at 64, 66-67 (Sept. 18, 1984) (volunteer firemen identify failed sirens and provide alerting).

329. Suffolk County's witnesses disagreed with LILCO's testimony on route alerting in essentially three respects. First, the County witnesses opined that Marketing Evaluations could not complete the telephone survey in 90 minutes. Tr. 5461-62, 5506 (Snow). Second, they asserted that notification and mobilization of route alert drivers would take a substantial amount of time (they incorrectly stated that route alert drivers would have to travel to the Shoreham plant when in fact, route alert drivers report to staging areas). Regensburg et al., ff. Tr. 5416, at 16-17; Tr. 5466-67 (Snow), 5007-08 (Weismantle, Renz). Third, they asserted that it would take too long for route alert drivers to traverse their route due to the lack of prior experience in driving the route, the length of the routes, traffic congestion, and interruption of the route alerting by the public. Regensburg et al., ff. Tr. 5416, at 17-19; Tr. 5506-08 (Snow); but compare Tr. 5467-70 with 5472-73 (Snow).

330. FEMA's witnesses testified that the Plan provisions for route alert drivers as a backup to the siren system are adequate and that the effectiveness of route alerting would be evaluated during an exercise or a communications drill. According to FEMA, the route alert drivers must meet the 45 minute requirement of NUREG-0654. Tr. 12689-90 (Kowieski); Baldwin et al., ff. Tr. 12,174, at 47-48; NUREG-0654, App. 3, at 3-3.

331. The Board finds that a backup notification method for the sirens need not be provided; consequently, any backup notification method provided need not meet the design basis time limitations for initial notification. Kansas Gas & Elec. Co. (Wolf Creek Generating Station, Unit No. 1), ASLBP-81-453-03 OL, slip op. at 19, 67 (July 2, 1983). Noting that many other emergency plans provide for route alerting as a backup to sirens, the Board also finds that the route alert driver procedure in the LILCO Plan provides an adequate backup to the siren system.

332. Intervenors also allege that members of the public will not hear or understand the message broadcast by route alert drivers. Regensburg et al., ff. Tr. 5416, at 20. LILCO has made special provisions for the hearing impaired. See OPIP 3.3.4. LERO will maintain a list of hearing impaired persons in the EPZ who will be notified by LERO if protective actions are recommended, and route alert drivers and/or ambulance drivers will notify those hearing impaired persons on an individual basis. Cordaro et al., ff. Tr. 4842, at 11, 15-16; Tr. 5023-26 (Weismantle). A route alert driver will not simultaneously perform the functions of notifying the public and notifying the hearing impaired. Tr. 5021-22, 5407-08 (Weismantle). In addition, the Public Information Brochure suggests that hearing impaired persons arrange to have a family member or neighbor notify them in the event of an emergency. Cordaro et al., ff. Tr. 4842, at 15-16; Tr. 5026 (Weismantle), 7831-32 (Robinson). The Board finds that LILCO has adequately provided for the notification of hearing impaired persons through the use of route alert drivers and through the suggestion in the Public Information Brochure that neighbors, family, or friends could also provide notification. The Board rejects the

notion that the public will be unable to understand the message broadcast by the route alert drivers. First, the non-English speaking population in the EPZ is too small to warrant translation of the message, and second, young children who might not understand the message are likely to be under the supervision of adults who will understand the message. See Findings 365-67; Cordaro et al., ff. Tr. 4842, at 16-17; Tr. 5050-57 (Weismantle, Cordaro, Renz).

333. Finally, Intervenor's allege that since route alert drivers are to abandon their routes if dosimetry readings exceed specified levels, there is no assurance that the public will be notified. Regensburg et al., ff. Tr. 5416, at 20-21. This ignores provisions in the LILCO Transition Plan for a replacement to be sent to complete the route in question should the original driver's exposure exceed a specified limit. Cordaro et al., ff. Tr. 4842, at 17-18; Tr. 5058-59 (Renz); OPIP 3.3.4, at 4A of 7, Att. 1. The ability of LILCO to provide replacements for route alert drivers who have exceeded the exposure level of 5 rem or alternatively, as FEMA suggests, to authorize exposures in excess of the 5 rem general public PAG up to the exposure limits for emergency workers and, thereby, permit drivers to complete their assignments provides reasonable assurance that route alert drivers will provide an adequate backup method of notification to the public. Baldwin et al., ff. Tr. 12,174, at 49.

Additional Alerting Time (57)

334. The County testified that coordinated activation of the Prompt Notification System and the Emergency Broadcast System does not provide special facilities and other organizations issued tone alert radios with any

additional alerting or preparation time and that if WALK-FM radio were unable to broadcast, the tone alert radios would not be activated. In their opinion, this would not provide adequate notification; however, they had no knowledge of the accepted practice at other sites. Regensburg et al., ff. Tr. 5416, at 22-23; Tr. 5477 (Snow). LILCO and FEMA maintain that these facts do not impair LILCO's ability to provide prompt notification to the public. Cordaro et al., ff. Tr. 4842, at 19; Baldwin et al., ff. Tr. 12,174, at 50.

335. First, the Board finds that the regulations and guidelines do not require that notification of special facilities need be in advance of notification to the general public. See Cordaro et al., ff. Tr. 4842, at 19; Baldwin et al., ff. Tr. 12,174, at 50. Second, the fact that only the signal from WALK-FM radio will activate the tone alert radios does not prevent prompt notification; in addition to the tone alert radios, sirens provide notification to the general public including personnel at special facilities. See Cordaro et al., ff. Tr. 4842, at 12-19; Baldwin et al., ff. Tr. 12,174, at 50; Tr. 5366 (Cordaro).

Verification of Notification to Special Facilities (58)

336. In addition to the sirens and tone-alert radios used to notify special facilities, the LILCO Transition Plan provides that the Public Schools Coordinator, the Private Schools Coordinator, and the Health Facilities Coordinator will contact the special facilities by telephone to verify that they are aware of the need to take protective action and to determine their specific needs for assistance. Cordaro et al., ff. Tr. 5337, at 8; Tr. 5364-65, 5387 (Robinson).

337. FEMA testified that use of commercial telephones for this type of verification satisfies the criteria of NUREG-0654. Baldwin et al., ff. Tr. 12,174, at 52; Tr. 12,715 (Kowieski).

338. Suffolk County contends that LILCO's use of commercial telephones to contact special facilities is inadequate because it will take "too long" and persons to be contacted may not be near their telephones or may be using the telephone. Regensburg et al., ff. Tr. 5416, at 24-25.

339. LERO maintains a listing of the special facilities in the EPZ, the transportation needs of each facility, and a telephone number for verification provided by the special facility. Cordaro et al., ff. Tr. 5337, Att. 1-3; Tr. 5347-48, 5379-81 (Robinson, Weismantle). A maximum of sixty-five special facilities would be contacted by telephone; a smaller number would be called if only a part of the EPZ were being advised to evacuate or if school were not in session. Cordaro et al., ff. Tr. 5337, at 9. If a special facility is in operation, there is always an administrator available to receive a phone call from LERO. Tr. 5383-87 (Robinson).

340. Although the Public Schools Coordinator, the Private School Coordinator, and the Health Facilities Coordinator have the primary responsibility for calling special facilities, as many as fifteen additional personnel could be drawn upon to assist the coordinators. Cordaro et al., ff. Tr. 5337, at 10, Att. 4; Tr. 5388 (Robinson). The Manager of LERO will set priorities and allocate personnel and resources as needed. Cordaro et al., ff. Tr. 7698, at 11; Tr. 5413, 7750, 7753 (Weismantle); OPIP 2.1.1, at 6.

341. In any case, LERO starts dispatching ambulances, ambulettes, and buses to the special facilities based on preplanning of transportation

needs as soon as an evacuation recommendation is effected. Thus, verification telephone calls are used merely to refine and adjust what LERO already has set in motion. Tr. 5396 (Weismantle). The ambulances and ambulettes can communicate with their parent companies and from the parent companies back to the EOC to make transportation adjustments. Id.

342. The Board finds that neither the regulations nor guidelines require that verification calls be completed within any specific time frame. NUREG-0654, II.E.1 provides only that the procedures "shall include means for verification of messages" and that "[t]he specific details of verification need not be included in the Plan." In any case, the facts show that verification calls to special facilities can be completed within a reasonable amount of time. The Board concludes that under the LILCO Plan there is reasonable assurance that special facilities will receive timely notification and that LILCO's plan for verification calls provides additional assurance that the health and safety of persons in special facilities will be protected.

Notification to Boaters (24.T, 59)

343. Contention 24.T alleges that LILCO does not have a letter of agreement with the Coast Guard to provide notification to boaters; however, Suffolk County's witnesses conceded that such a letter of agreement exists. Tr. 5523-25 (Roberts); see also Plan at App-B-8. Contention 59 alleges that the LILCO Transition Plan is inadequate because the Coast Guard will not have the capability of notifying boaters on Long Island Sound within 15 minutes.

344. Long Island Sound is an extended water area frequented by transient boats. Tr. 5525-26 (Hoffman). Such areas are excepted from the 15-minute notification criterion of 10 C.F.R. Part 50, Appendix E, IV.D.3. See NUREG-0654, App. 3, at 3-3; Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 & 3), LBP-82-39, 15 NRC 1163, 1268-69 (1982), aff'd, ALAB-717, 17 NRC 346 (1983). In addition, at least one other factor suggests that extended waterways such as Long Island Sound should be exempt from the 15-minute notification and that more time can safely be allowed to notify boaters. "Once boaters are notified, they can start out of the 10-mile area immediately and probably get out of it entirely in an hour or less." Id. at 1269. By contrast, the evacuation time estimate for the land portion of the Shoreham for full 10-mile evacuation is about 5 hours. See Table 1, Case 12 above.

345. By letter of agreement the Coast Guard will provide notification of an emergency with protective action recommendations to boaters on the portions of Long Island Sound within the EPZ. The Coast Guard will broadcast an emergency message over marine band radio and direct Coast Guard boats to make a concerted effort to contact boats within 10 miles of Shoreham. Cordaro et al., 4/6/84 Vol. II, at 38-39, Att. 31; Cordaro et al., ff. Tr. 4842, at 21-22; Tr. 5101 (Renz). Out to about 2 miles into Long Island Sound, LILCO's sirens are effective to give notice to boaters. LILCO's witnesses testified that smaller boats, which normally would be closer to shore, should be in a position to hear the sirens sound; boats farther than 2 miles from the shore are likely to have marine band radios. Cordaro et al., ff. Tr. 4842, at 22-23; Tr. 5134-39 (Hobbs, Renz, Cordaro); see San Onofre, supra,

15 NRC 1163, at 1268 n.62 (1982), aff'd, 17 NRC at 376 (1983). LILCO's provisions for notifying boaters are identical with the notification provisions for boaters on Long Island Sound contained in Connecticut's Radiological Emergency Response Plan for the Millstone Power Station. Cordaro et al., ff. Tr. 4842, at 22.

346. LILCO also has a letter of agreement with Island Helicopter, Cordaro et al., 4/6/84 Vol.II, Att. 35, and can supplement Coast Guard notification with notification by helicopter. Tr. 4857, 5147-48, 5152-53 (Renz, Weismantle).

347. Suffolk County's witnesses testified that notification by direct intervention with boats would be inadequate because it would take at least the 90 minutes estimated by the Coast Guard and more likely, the County suggests, between 3-3/4 and 8 hours, since Coast Guard boats would have to travel to reach the EPZ and would then require additional time to cover the EPZ waterway. Roberts et al., ff. Tr. 5522, at 3-4, 6; Tr. 5545-46 (Roberts, Reed).

348. The County also testified that notification by marine band radio would be inadequate because (1) many boats are not equipped with marine band radios, (2) boaters generally do not have their radios on, (3) even if the radio is on, it may not be tuned to the emergency frequency, and (4) boaters may not hear the Coast Guard broadcast either because the noise from the boat engine is too loud or the boater is in a "dead spot." Roberts et al., ff. Tr. 5522, at 4; Tr. 5546-48, 5552-56 (Hoffman, Read).

349. The Board finds that dispatching Coast Guard boats from locations outside the EPZ would be a relatively slow method of notification and,

therefore, not preferred without additional more rapid notification methods. See San Onofre, supra, 15 NRC at 1268 n.62 (1982), aff'd, 17 NRC at 376 (1983). Boats within two miles of shore will receive adequate notification from LILCO's sirens and the Board agrees "[i]t seems reasonable to assume that larger boats further out [than one or two miles from shore] would have relatively sophisticated communication equipment to receive word of the emergency . . .," id. The Board notes the testimony of Suffolk County's witness that boaters regard marine radios as emergency equipment that will be turned on, at the very least, when they observe trouble, see Tr. 5547 (Reed). Nonetheless, we believe that there may be circumstances where notification over marine radio may not be entirely adequate. Supplemental notification could be provided, as LILCO testified, by helicopters, Tr. 4857, 5147-48, 5152-53 (Renz, Weismantle), and the Board finds that LILCO's plan for notifying boaters is adequate provided that helicopters are used to supplement notification by the Coast Guard. Other licensing boards have found that such means, i.e. notification by boat, marine radio, and helicopter, provide adequate notification to boaters. See San Onofre, supra, 15 NRC at 1268 n.62 (1982), aff'd, 17 NRC at 376 (1983); Pacific Gas & Elec. Co. (Diablo Canyon Nuclear Power Plant, Units 1 & 2), LBP-82-70, 16 NRC 756, 814, 816 (1982). Moreover, we are unaware of any proceedings in which a licensing board required any further means of notifying boaters. The Board concludes that, provided LILCO incorporates the use of helicopters into its Plan, the collective means of notification proposed by LILCO provide reasonable assurance that boaters in the EPZ will be adequately notified.

B. WALK-AM (20)

350. The County's prefiled testimony merely recites Contention 20 which states that, in the event a radiological accident occurs at night, persons without FM radios may be unable to receive adequate information because WALK-AM does not operate at night. Regensburg et al., ff. Tr. 5416, at 23. The witnesses testified that they did not believe WALK will broadcast simultaneously on AM and FM at night, Tr. 5477 (Snow), but conceded that they were aware that WALK-AM had broadcast at night in the past, Tr. 5504 (Regensburg, Snow).

351. In an emergency, WALK AM and FM will broadcast EBS messages to the public and thereby provide the public with both notification of an accident and information as to the recommended protective actions. Clawson et al., ff. Tr. 5254, at 4. The signal sent by WALK-FM will also activate the tone alert radios. Clawson et al., ff. Tr. 5254, at 4; Tr. 5267-69 (Clawson), 12,743-44 (Keller).

352. WALK-AM's current license permits normal AM broadcasting during daylight hours and FM broadcasting 24 hours a day. Clawson et al., ff. Tr. 5254, at 5; Baldwin et al., ff. Tr. 12,174, at 9. WALK's letter of agreement with LILCO states that WALK has the capacity to send prepared informational/instructional messages over both AM and FM radio airways utilized by WALK. Clawson et al., ff. Tr. 5254, at 5, 7, Att. 1.; Tr. 5287-89 (Clawson); see also Tr. 12,181 (McIntire). WALK has the ability to and has committed to broadcast on its AM station 24 hours a day, if necessary, during a radiological incident at Shoreham. Clawson et al., ff. Tr. 5254, at 7, Att. 2.

353. Federal Communications Commission regulations permit AM stations to use their full daytime facilities at night to broadcast emergency information. 47 C.F.R § 73.1250(f). In the past, WALK-AM has broadcast beyond its normal broadcast hours during an emergency. Clawson et al., ff. Tr. 5254, at 6-7; Baldwin et al., ff. Tr. 12,174, at 9; Tr. 5293-94 (Clawson) 12,179 (Kowieski), 5504 (Regensburg, Snow); see also Tr. 5309-10 (Clawson).

354. As of March 29, 1984, LILCO has signed letters of agreement with eleven additional Long Island radio stations that have agreed to use their full daytime capabilities during nighttime to broadcast EBS messages about an incident at the Shoreham plant. Clawson et al., ff. Tr. 5254, at 8, 9, Att. 4-12; Tr. 5315-16 (Clawson). The other EBS radio stations will receive the EBS message by means of the attention signal from WALK-FM activating a FCC approved broadcast receiver, tuned to the frequency of WALK-FM, the Common Program Control Station (CPCS). Tr. 5269 (Clawson); Clawson et al., ff. Tr. 5254, at 10, Att. 4-12. In the unlikely event that WALK-FM can not broadcast, LERO will endeavor to contact the other radio stations and relay the EBS message to them directly. Tr. 5321-22 (Clawson).

355. The Board finds that LILCO's Emergency Broadcast System consisting of WALK AM and FM, and eleven other local radio stations provides reasonable assurance that the public, including persons without FM radios, will receive prompt, adequate information in the event of a radiological emergency at Shoreham.

C. Zones and Routes (18)

356. NUREG-0654 II.G.1 provides that public information shall include information regarding "protective measures, e.g., evacuation routes" and that "means for accomplishing this dissemination may include, but are not necessarily limited to: information in the telephone book; periodic information in utility bills; posting in public areas; and publications distributed on an annual basis."

357. The Intervenors contend, without any supporting testimony, that LILCO's public information materials (1) do not inform persons in which zone they are located or the evacuation routes from that zone, and (2) do not describe the zones in which protective actions should be taken.

358. The EBS messages in OPIP 3.8.2 inform people if they are in a zone where evacuation is recommended with both a listing of the zones and a boundary description by major roads and landmarks of the combined zonal area affected by a protective action recommendation. Clawson et al., ff. Tr. 10,035, at 14, Att. 11.

359. Although the EBS messages do not include a narrative description of the evacuation routes, LILCO provides a variety of public information from which people will be able to identify the zone in which they live or are located and the evacuation routes from that zone. Clawson et al., ff. Tr. 10,035, at 9. These include the Public Information Brochure, which clearly indicates the zone in which a person is living and the evacuation routes from that zone, Clawson et al., ff. Tr. 10,035, at 9, Att. 1-2; an insert in the Suffolk County telephone directory that includes a map of the EPZ identifying all the zones, id. at 9-10, Att. 3; maps in community telephone directories showing

both the zones and evacuation routes in that community, id. at 10, Att. 4; refrigerator magnets showing the zone of the home to which they are distributed, id. at 10, Att. 5; stickers for automobile gloveboxes showing both the zone of the home to which it is distributed and the evacuation route from that zone, id. at 11, Att. 6; and emergency posters at beaches and recreational areas in the EPZ showing the zone where the poster is located and the evacuation routes from that zone, id. at 12.

360. In addition, emergency packets will be distributed annually to each of the approximately 4000 non-residential LILCO customers in the EPZ. Each packet will include (a) a letter asking the commercial establishment to display the public information materials in a prominent location, (b) a window display poster and emergency flyers for the public that show the zone in which the commercial establishment is located and the evacuation routes from that zone, (c) a postpaid card to request additional pamphlets, and (d) a sticker instructing people to turn to EBS stations when they hear the siren. Id. at 11-12, Att. 7-10; Tr. 10,163 (Clawson). LILCO will replenish the materials upon request from either the commercial establishment or a LILCO meter reader, who will periodically check the supply of pamphlets. Tr. 10,163 (Clawson). Meter readers also will check whether the information is being posted. Id.

361. The maps in the Public Information materials have been reviewed for accuracy by Edward B. Lieberman and for clarity by Dr. Mileti and personnel in eleven of LILCO's district offices. The maps received favorable reviews. Tr. 10,038-45, 10,165 (Clawson).

362. If a person, for some reason, did not have access to LILCO's public information materials, he could simply follow the blue and white trail-blazer signs that will be located along every major road. There also will be traffic guides posted on all major roads to assist people in evacuating. Clawson et al., ff. Tr. 10,035, at 12; Baldwin et al., ff. Tr. 14,151, at 8b-8c.

363. The Board finds that LILCO's public information materials provide reasonable assurance that persons in the EPZ will be able to determine if they are in a zone where evacuation is recommended and the evacuation routes from that zone.

D. Hispanics (21.C)

364. The contention alleges that the public education materials and EBS messages will be incomprehensible to members of the public whose only language is Spanish. Intervenors presented no testimony.

365. FEMA/NRC Guidance Memorandum Number 20, entitled "Foreign Language Translation of Public Education Brochures and Safety Messages," states that

Licensees, States, and local governments should provide public education and information (brochures and safety messages) translated into a foreign minority language, if the number of the foreign population of voting age exceeds 5% of a surrounding county's or equivalent population.

Clawson et al., ff. Tr. 5752, at 7-8, Att. 3, at 2; see also Baldwin et al., ff. Tr. 12,174, at 10; Tr. 12,978-79 (Kowieski, Keller).

366. The 1980 census data indicate that of the over 100,000 residents of the EPZ, there are only 419 Hispanic residents in the EPZ who speak

English either poorly or not at all. This is approximately 0.04% of the EPZ population, significantly less than the threshold of Guidance Memorandum 20. Furthermore, even if the Board adopted the figure used in Contention 21.C of 1,300 Hispanic residents who speak English poorly or not at all, this would still be less than 5% of the EPZ population. Clawson et al., ff. Tr. 5752, at 6-8, Att. 1-2; see also Tr. 12,979, 12,982 (Kowieski, McIntire, Baldwin).

367. Guidance Memorandum 20 also recommends that

If minority language individuals in the plume exposure pathway do not exceed 5% of the population and there are no foreign language materials provided, other efforts should be made to afford such protection similar to that provided to the general population. Efforts might include:

*providing oral assistance to individuals through a buddy system.

Clawson et al., ff. Tr. 5752, Att. 3, at 2; see also Tr. 5781 (Clawson).

368. To reach the Spanish-speaking minority, LILCO plans to publish an article in Spanish in "Keeping Current" to alert people who only speak Spanish that an emergency planning brochure, which explains important aspects of emergency planning for Shoreham, will be sent to them. This article will encourage Spanish-speaking residents of the EPZ to find a "buddy" who can translate the public information and assist them in the event of an emergency at Shoreham. If they are unable to locate their own buddy, the article in "Keeping Current" will encourage them to write to LILCO, and LILCO will attempt to find a suitable buddy. Tr. 5757-58, 5781 (Clawson).

369. LILCO also has sent a letter and postage prepaid postcard to survey special needs to every household in the EPZ to survey for special needs; the letter and postcard include a bold face type statement in Spanish

asking people to advise LILCO if Spanish is their only language. A Spanish translation of both the letter and postcard were sent to all households who identified themselves as Spanish-speaking in response to LILCO's survey. Mailing lists for Spanish-language newspapers were checked to identify additional Spanish-speaking families in the EPZ who had not returned the postcard, and may be in need of information. Clawson et al., ff. Tr. 5752, at 9, Att. 4-6; Tr. 5783-84 (Clawson).

370. The Board finds that the population of the EPZ whose only language is Spanish is less than 5% of the total population and concludes, in accordance with Guidance Memorandum 20, that LILCO's public information materials and EBS messages need not be translated into Spanish. The Board also finds that LILCO has made reasonable efforts to reach individuals whose only language is Spanish and to provide them with protection similar to that provided the general public.

E. Brochure (16.E)

371. Suffolk County contends that LILCO's public information program is inadequate because it does not include a meaningful discussion of the magnitude of radiation doses and health effects that could result from a serious accident. The County contends that a discussion of the range of potential exposures and the resulting probability of early and delayed health effects should be included so that the public can make informed judgments about their responses to protective action recommendations. Radford and Saegert, ff. Tr. 14,105, at 3, 6-9, 11.

372. 10 C.F.R. Part 50, Appendix E, IV.D.2 requires that "general information as to the nature and effects of radiation" shall be provided

annually to residents of the EPZ. NUREG-0654 II.G.1 requires that the public be provided with "educational information on radiation." Clawson et al., ff. Tr. 14,061, at 2-3.

373. LILCO provides educational information on radiation through both its Public Information Brochure and its "Keeping Current" newsletter. The brochure, which will be distributed to residents of the EPZ annually, contains general information on the nature and effects of radiation. The Spring 1984 issue of "Keeping Current" included a more detailed discussion about the nature of radiation, acceptable radiation exposure levels, and effects of radiation from both routine operations and serious accidents at nuclear plants. The article in "Keeping Current" or material similar to it will be distributed annually. Clawson et al., ff. Tr. 14,061, at 5-6, Att. 1-2.

374. The regulations and guidelines do not require that information on radiation necessarily be included in the brochure. They state only that "educational information on radiation" be provided annually. In addition, FEMA testified that there is no requirement that all public information on radiation be included in the brochure and that a discussion about the potential magnitude of doses and health effects of a serious accident would be "inadvisable" for a brochure. Tr. 14,175, 14,184-87 (Keller).

375. LILCO's public information materials adequately inform the public about the risks associated with radiation. FEMA testified that there is no requirement that public information materials address the magnitude of doses and health effects that could result from a serious accident and that a simple statement that high exposure can be injurious to one's health is sufficient. Baldwin et al., ff. Tr. 14,151, at 8a; Tr. 14,187 (Keller). Both LILCO and

FEMA testified that the purpose of a brochure is not to provide a course in radiation biology, but rather to inform people what to listen for and what actions to take in an emergency. Tr. 14,086-87 (Clawson), 14,174-78 (Keller, McIntire). See Louisiana Power & Light Co. (Waterford Steam Electric Station, Unit 3), LBP-83-27, 17 NRC 949, 960 (1983); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1522-26 (1981), aff'd subject to a condition, ALAB-697, 16 NRC 1265 (1982). The brochure makes clear that accidents can occur, that radiation could be released and can be hazardous, and that protective actions will be recommended to the public based on the radioactive release. Cordaro et al., ff. Tr. 14,061, at 8, Att. 1; Tr. 14,089-90, 14,099-100 (Clawson, Cordaro, Watts).

376. In addition, the article in "Keeping Current" discusses the magnitude of doses and health effects that could result from a serious accident. Clawson et al., ff. Tr. 14,061, at 6-7, Att. 2. The article states that people could be exposed to dangerously high levels of radiation during a severe accident at a nuclear plant, that "exposure to very large amounts of radiation over a short period of time (several minutes to several hours) can cause serious injury to cell tissues, and even death," and that "animal studies show that large doses can cause genetic damage which continues through several generations of offspring." Id. Mrs. Clawson testified that none of the brochures she had reviewed included this much detail on the magnitude and effects of radiation, id. at 12, and we were unable to find any case where a Licensing Board required an amount of detail anywhere approaching what has been included in the "Keeping Current" article. See Waterford, supra;

Consumers Power Co. (Big Rock Point Plant), LBP-82-60, 16 NRC 540 (1982); Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit 1), LBP-82-48, 15 NRC 1549 (1982), aff'd with certain modifications, ALAB-727, 17 NRC 760 (1983); Three Mile Island, supra, 14 NRC at 1522-26.

377. The Board finds that information on radiation may be included in any public information provided to residents of the EPZ annually and that LILCO's public information on radiation is more than adequate to meet the regulations and guidelines.

VII. SHELTERING (61)

378. In Contention 61 the Intervenor's assert that sheltering in the Shoreham EPZ is an unworkable protective action recommendation because (1) people sheltering in buildings providing more shielding than a wood house "could still receive doses that would cause adverse health effects" in the event of a "severe accident"; (2) a large number of homes and other structures in the EPZ are constructed of wood and are without basements, affording a reduction in dose of only 10%, which is inadequate; and (3) people in cars, outdoor recreational areas, and boats at the time of a sheltering recommendation will not be protected. The Intervenor's contend, in light of this information, that sheltering is not an adequate protective action and that the LILCO Plan therefore does not comply with 10 C.F.R. §§ 50.47(a)(1) and (b)(10) and NUREG-0654 II.J.9. For the reasons stated below, we disagree with Contention 61 and find that the provisions in the LILCO Plan for making the protective action recommendation of sheltering are adequate.

379. Section 50.47(b)(10) of 10 C.F.R. provides that a range of protective actions should be developed for the public; NUREG-0654 II.J.9 suggests that capability for implementing protective actions should be established consistent with EPA's recommendations regarding exposure from passage of radioactive airborne plumes. The Intervenor's contentions, and at times the Intervenor's witnesses, see Finlayson et al., ff. Tr. 12,320, at 7, suggest that the applicant must show that protective action recommendations, if taken, "guarantee" that no health-threatening doses will be received by any member of the public. That standard is not found in NRC regulations or guidelines. Indeed, an underlying assumption of the emergency planning regulations is that in a serious accident, people might receive harmful doses of radiation. Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 & 3), CLI-83-10, 17 NRC 528 (1983). The principal goal of emergency planning is maximum dose savings, Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit 1), ALAB-727, 17 NRC 760, 770 (1983); "the NRC does not intend that emergency plans must aim at the impossible in an emergency, namely the prevention of any dose which exceeds the relevant PAG's," Philadelphia Elec. Co. (Limerick Generating Station, Units 1 & 2), LBP-84-31, 20 NRC ___, slip op. 114 n. 12 (August 29, 1984). Emergency planning is intended to provide a layer of protection over and above the other safety requirements of the NRC; it is not required to eliminate all residual risks of nuclear power, and there is no requirement that extraordinary measures, such as building shelters or stockpiling blankets, be undertaken. Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 & 3), LBP-82-39, 15 NRC 1163, 1188, 1200 (1982);

NUREG-0396 at 14-15. Thus, the implicit notion in Contention 61 that to be adequate, plans must prevent the possibility of "health-threatening" doses, is erroneous. No power plant in New York State, or in the country, can guarantee zero dose through the use of protective actions in the event of an accident. Cordaro et al., ff. Tr. 8760, at 28.

380. Under the LILCO Plan, as with most emergency plans for nuclear power plants, protective action recommendations are based in part on a comparison, under the circumstances of a particular accident, of the dose that might be received by the population if it shelters relative to the dose if it evacuates. Cordaro et al., ff. Tr. 8760, at 21; Tr. 12,386 (Finlayson). The EPA Protective Action Guides (PAG's) for general shielding factors are used under the Plan in determining the dose savings of sheltering versus evacuation. Plan, OPIP 3.6.1; Cordaro et al., ff. Tr. 8760, at 19, 20; Finlayson et al., ff. Tr. 12,320, at 3, 7. Sheltering can reduce doses to the public, Tr. 12,333, 12,346 (Radford), 12,383, 12,387 (Finlayson), and the County witnesses would not recommend eliminating sheltering as an option in the LILCO Plan. Tr. 12,384 (Finlayson, Minor). See also Tr. 12,386 (Finlayson). In accordance with the LILCO Plan, many factors are considered in making a protective action recommendation, Tr. 8792, 8793, 8800 (Miele), 8895 (Watts), including the plant conditions at the time of the accident, Tr. 8789-90, 8791, 8895-96 (Watts), 8800 (Miele); meteorological conditions, Tr. 8791, 8895-96 (Watts), 8800 (Miele); route conditions, Tr. 8791 (Watts); evacuation times, Tr. 8800 (Miele), Tr. 8895-96 (Watts); and duration of releases, id. In general, one would recommend the action that would result in the lower of the two doses. Tr. 8886 (Watts). But the decision is a complex one, Tr. 8803

(Cordaro), and many factors come into play, including survey team results, dose assessments, and dose projections. Tr. 8804 (Watts); see also Tr. 8888-89 (Cordaro), 8889, 8891-92, 8900 (Watts); see, e.g., Finlayson et al., ff. Tr. 12,320, at 4, 5-6. The resulting recommendations will be made based upon the judgment of trained health physics professionals implementing the procedures contained in the Plan. Tr. 8791, 8802 (Cordaro), 8834, 8901 (Watts).

381. The LILCO Plan uses an average whole body plume shielding factor for Suffolk County of 0.7, which is representative of the housing in the County. Cordaro et al., ff. Tr. 8760, at 22; Tr. 8869-70 (Watts); Finlayson et al., ff. Tr. 12,320, at 5. The construction types of residences on Long Island and the percentages of those types of housing in Suffolk County were obtained from the Suffolk County Planning Department; a surveying firm then verified that the Planning Department's county wide statistics apply to the Shoreham EPZ specifically. Tr. 8847 (Daverio). Significantly, although the County presented several witnesses on the issue of sheltering, Tr. 12,317 (Radford, Finlayson, Minor), no testimony was presented that contradicts LILCO's statement that the shielding factor for Suffolk County is representative of the housing in the EPZ. See, e.g., Finlayson et al., ff. Tr. 12,320, at 5. One County witness said that while he personally was unfamiliar with the shielding characteristics of housing around Shoreham, he had received information from his colleagues that the housing in Suffolk County is "a fairly typical eastern United States mix of housing" with frame, brick, and stone houses, some with basements and others without. Tr. 12,350, 12,351 (Radford). Thus, there is nothing in the record before us that supports the

County's contention that the structure of the houses in the Shoreham EPZ renders sheltering ineffective as a protective action.

382. In addition, we find that the LILCO Plan provides reasonable assurance that if sheltering is the protective action recommendation, persons in automobiles, outdoor recreation areas, and boats will have the opportunity to take shelter.

383. First, people in cars will hear the sirens if they are in the 10-mile EPZ, and most will have almost immediate access to radios. Cordaro et al., ff. Tr. 8760, at 24. A driver living in the EPZ would be able to reach a place of shelter (his home or a nearby building) relatively quickly. Even if he chose to drive out of the EPZ, he would be traveling faster than the average windspeed near the Shoreham plant. Consequently, a person would be able to drive to a point outside the EPZ from any point within it within 30 minutes, assuming he had to drive 10 miles and did so at 20 miles per hour. Cordaro et al., ff. Tr. 8760, at 24.

384. Second, the LILCO Plan's EBS message on sheltering instructs people not at home to seek shelter inside buildings. Plan, OPIP 3.8.2, at 22 of 38. When the sirens are sounded, the transient population will be able to mobilize rapidly and seek shelter in a building or return to their homes. Therefore, LILCO has chosen not to identify specific public buildings for shelters within the EPZ for transients because (1) it is not likely that nonresidents would be able to find particular buildings, and (2) residents should be encouraged to return to their homes, which would make any subsequent evacuation easier for them. Cordaro et al., ff. Tr. 8760, at 25-26. People on beaches will also see posters with instructions to be followed if sirens sound; most of these people are residents of the area. Tr. 8905 (Daverio).

385. Third, boaters will be notified regarding an emergency by sirens and can receive sheltering instructions over their radios. Cordaro et al., ff. Tr. 8760, at 26. In addition, the Coast Guard will transmit messages to boats by marine band radio, advising people to leave the area, and Coast Guard boats will be dispatched to notify remaining boaters to advise them to leave the area and to restrict marine traffic within the 10-mile EPZ. Cordaro et al., ff. Tr. 8760, at 26; Tr. 8906 (Daverio); see also the Findings on Contention 59, above.

386. Therefore, the Board finds that sheltering is a viable protective action option under the LILCO Plan that, if implemented, would provide reasonable assurance of protection to the public.

VIII. MAKING PROTECTIVE ACTION RECOMMENDATIONS

A. Selective Evacuation and Selective Sheltering (60, 63)

387. The Intervenor's allege in Contentions 60 and 63 that the selective sheltering options provided for in the LILCO Plan are inadequate because the Plan does not set forth (1) guidelines to be used by LERO in choosing to recommend selective sheltering and selective evacuation, and in determining the individuals who might be subject to those recommendations, or (2) procedures to implement those recommendations. As a result, the Intervenor's contend that the Plan fails to comply with 10 C.F.R. §§ 50.47(a)(1) and (b)(10), and NUREG-0654 II.J.9 & J.10.

388. Under the LILCO Plan, selective sheltering and selective evacuation are protective actions that may be ordered at a projected dose below the Environmental Protection Agency's (EPA) accepted PAG's (Protective Action

Guides) to minimize exposure to radiosensitive persons, particularly pregnant women and children. Cordaro et al., ff. Tr. 8760, at 9, 30. Selective sheltering and selective evacuation recommendations result in only a portion of a population in a particular area being advised to shelter or evacuate, with the remaining population being advised to take other actions or to do nothing. Id.

389. The New York State Radiological Emergency Plan provides for selective sheltering "at projected doses below those guidelines [the EPA PAG guidelines] particularly [for] pregnant women and children" and "for individuals who could not safely be evacuated . . . [including] individuals who have been designated medically unable to withstand the physical and/or psychological stress of an evacuation, as well as those individuals who require constant, sophisticated medical attention." Cordaro et al., ff. Tr. 8760, at 10, Att. 2. LILCO included selective sheltering and selective evacuation in the LILCO Plan in order to be consistent with the New York State Plan and to ensure that Local Emergency Response Organization (LERO) personnel would be familiar with the State's terminology should New York State decide to take an active role in an emergency response for Shoreham. Cordaro et al., ff. Tr. 8760, at 9-10, 34.

390. The LILCO Plan provides that selective sheltering or selective evacuation for the public would not be recommended "without consultation with the New York Commissioner of Health," and LERO would recommend selective sheltering or selective evacuation only if instructed to do so by New York State officials. Cordaro et al., ff. Tr. 8760, at 9-10; Plan at 3.6-6. Absent instructions from the State, if sheltering or evacuation were deemed

to be advisable for any portion of the population based upon EPA PAG guidelines, LERO would recommend sheltering or evacuation for the entire population in the affected area. Cordaro et al., ff. Tr. 8760, at 11; Tr. 8778, 8780, 8784, 8822, 8825 (Daverio), 8784 (Miele), 8787, 8805 (Cordaro), 8813 (Watts). LILCO bases this decision upon the advice of behavioral experts, among them Dr. Dennis Mileti, who testified that where a selective sheltering or selective evacuation recommendation is issued to the public, persons other than those advised to take action may do so, Cordaro et al., ff. Tr. 8760, at 12, 32-33, and that a selective evacuation recommendation to the public is likely to be confusing. Tr. 8837, 8839 (Mileti).

391. While Contention 61 alleges that the LILCO Plan does not have any guidelines for choosing selective sheltering as a protective action option, the Board finds that the LILCO Plan does contain sufficient guidelines. According to the Plan, selective sheltering would be implemented at the instruction of the State, "for projected doses below the accepted PAGs" (that is, below 1 rem whole body or 5 rem thyroid) and for "pregnant women and children." Cordaro et al., ff. Tr. 8760, at 13, Att. 1. Selective evacuation would be implemented, at the instruction of the State, for "projected dose levels of 1-5 rem whole body or 5-25 rem thyroid," and for "pregnant women and children 12 years and under." Cordaro et al., ff. Tr. 8760, at 30-31. These guidelines were taken directly from EPA's PAGs, which allow flexibility in protective action recommendations. Cordaro et al., ff. Tr. 8760, at 31-32. The State, or LERO if requested by the State, would issue a specific recommendation of selective sheltering or selective evacuation through EBS messages, using the procedures outlined in the evacuation section of the State

Plan at III-43. Cordaro et al., ff. Tr. 8760, at 13-14, 35, Att. 10. We reject the assertion by County witnesses that the guidelines listed above are "vague" and "meaningless." See Harris and Mayer, ff. Tr. 9777, at 10, 11.

392. Footnote B on page 44 of OPIP 3.6.1 sets forth guidelines for determining whether sheltering might be advisable for the radiosensitive population, Tr. 8789 (Miele), 8787, 8788 (Cordaro); many factors would be considered in determining what level below one rem would warrant a protective action of sheltering, Tr. 8814 (Watts), and therefore it is difficult to define in advance what fraction of a whole body dose of one rem might result in taking protective actions, Tr. 8816-17 (Watts). Based on information available at the time of an accident, LERO might consider taking certain actions to be prudent and conservative. Tr. 8816-17 (Watts).

393. LERO may recommend sheltering of certain medical institutions within the Shoreham EPZ, as explained in LILCO's testimony in response to Contention 72, discussed below. To the extent that special facilities such as hospitals who have persons under medical care elect to shelter their patients in lieu of evacuation, a "selective sheltering" recommendation of sorts is being implemented in the Shoreham EPZ. Tr. 8778, 8780 (Daverio).

394. Suffolk County witnesses Harris and Mayer assert (1) that no facility-specific plans exist under which special facilities could implement sheltering and (2) that sheltering, as a practical matter, cannot be accomplished in special facilities for a variety of reasons. Harris and Mayer, ff. Tr. 9777, at 12-21.^{83/} For the reasons stated below, we reject Drs. Harris

^{83/} This testimony was admitted over LILCO's objection that it went beyond the scope of Contentions 60 and 63.

and Mayer's testimony.

395. As to the assertion by Drs. Harris and Mayer that no facility-specific plans exist for implementing sheltering, the overwhelming weight of evidence is to the contrary. LILCO witnesses testified that LILCO has provided assistance to the facilities regarding sheltering by visiting the facilities, reviewing blueprints, and discussing sheltering suggestions with the staff. Tr. 9040 (Weismantle). In addition, facility-specific emergency plans and procedures are being developed by LILCO with the staffs of the special facilities. Tr. 10,053 (Miele); see LILCO Ex. 38-47. These plans were developed using a full-time planner and two consultants to do the kind of detailed procedure writing that the facilities are too busy or lack the resources to do themselves. Tr. 10,053-54 (Robinson). At the time the testimony was taken on June 5, 1984, every special facility in the EPZ had been visited and toured by LILCO personnel; some meetings had been held following issuance of draft facility-specific plans; oral comments had been taken into account in revisions to the plans; and facility-specific floor plans for some facilities had been developed for sheltering within the facility. Tr. 10,054-55 (Robinson), 10,055 (Miele). The draft plans cover definitions of different classifications of emergencies, communications, organization of facility and staff responsibilities, staffing needs, preparation of residents, sheltering procedures, and evacuation procedures. Tr. 10,055-56 (Robinson).

396. For each facility, sheltering areas were chosen by health physics people from LILCO and consultants, following a tour with the administrator to determine which areas in the facilities would provide the best sheltering factors. Tr. 10,056-57 (Yedvab), 10,055-56 (Miele). The number of people to

be sheltered was taken into account; working with hospital and nursing home administrators, LILCO personnel determined how much space was necessary and where that space should be located based on the amount of shielding afforded by the building structures. Special needs such as food for people and special equipment also were taken into account. Tr. 10,058-59 (Miele).

LILCO will continue to provide expert advice and help to these facilities on revisions to these procedures. Tr. 10,060 (Robinson).

397. LILCO has tailored certain implementing procedures to individual facility needs. One hospital, for example, chose not to move maternity and newborn patients, and its procedures were altered to meet that constraint. Tr. 10,056 (Miele).

398. LILCO also has agreed to provide special equipment to some of the facilities. For example, LILCO will provide some hospitals with portable oxygen equipment and portable suction equipment, and will relocate certain electrical lines so that the equipment can run. LILCO also worked with the hospitals to improve sheltering by isolating ventilation, and will provide shields to cover ventilation equipment. Tr. 10,060 (Miele). LILCO is working with a second hospital to enlarge some of the doorways for ease of access into and out of areas selected for sheltering. Tr. 10,056 (Miele).

399. Some training has already been provided to the hospitals. Tr. 10,060 (Miele). At the time that the testimony was taken, one nursing home had already conducted drilled using the sheltering procedures provided by LILCO. Tr. 10,061 (Robinson).

400. In the event of an emergency, LERO personnel would call each of the facilities to be sure that they were aware of the protective action recommendation and ask if any further information was needed. Id. The primary means by which sheltering would be carried out would be based on the plans that were developed ahead of time by LILCO in conjunction with the special facilities. Tr. 9040 (Weismantle).

401. There are sections of the plans which still need to be completed, as indicated during cross-examination by New York State. See, e.g., Tr. 10,100-11 (Miele, Robinson, Yedwab). The plans will be completed by LILCO and the facilities as appropriate. Tr. 10,112 (Robinson). LILCO will develop similar plans for the remaining special facilities in the EPZ. Tr. 10,057 (Robinson). The plans for each facility will be updated annually, Tr. 10,061-62 (Robinson), but will not be incorporated into the LILCO Plan so as not to clutter it up with unnecessary detail. Tr. 9042 (Weismantle), 10,062, 10,088 (Robinson).

402. Contrary to the testimony of Drs. Harris and Mayer that administrators of special facilities have expressed doubt, and many stated outright that sheltering is impossible, LILCO witness Miele, who had personally been to each hospital and some of the nursing homes in the EPZ, and who had had persons who report to him visit the remaining nursing homes and special facilities, stated that special facilities administrators understand their responsibility to their residents and are willing to work with LILCO to protect their residents. Tr. 10,066 (Miele). There is no question that there are political overtones to the situation at Shoreham, and LILCO employees do not approach facility administrators and ask whether they support the opening of the

Shoreham plant. Id. Facility personnel, however, are willing to work with LILCO to plan for sheltering, and no administrator has mentioned during discussions that sheltering could not be accomplished or that people would be abandoned at the special facilities. Tr. 10,066-67 (Miele). Similarly, hospital, nursing, and adult home officials, while they are not interested in taking a position either for or against the opening of Shoreham, have worked responsibly with LILCO to determine how best to protect residents in the event of an emergency at Shoreham, Tr. 10,067-69 (Yedvab), 9083 (Glaser), with the exception of the Suffolk Infirmary and one nursing home, which have elected not to plan with LILCO, Tr. 10,069 (Robinson).

403. In contrast, Drs. Harris and Mayer asserted in their prefiled testimony, dated March 2, 1984, that no facility-specific plans exist. Harris and Mayer, ff. Tr. 9777, at 13-14. They contended that administrators of special facilities "expressed doubt about the feasibility of sheltering their patients," id. at 14, and that certain practical constraints such as providing oxygen and moving beds into hallways had not been considered by LILCO, id., at 15-16, when in fact, as discussed above, they have. The Board finds it troubling that although Drs. Harris and Mayer had reviewed some draft facility-specific plans prior to appearing on June 1, 1984 in this proceeding, Tr. 9819-21 (Harris, Mayer), they made no effort to modify their March 2 testimony to reflect the more recent information. In addition, they did not contact special facilities between March 2 and June 1 to update their testimony, Tr. 9843-44, 9849 (Harris, Mayer), although their previous contacts, upon which their prefiled testimony is based, dated to February of 1984 -- six months prior to their appearance at the hearings. Tr. 9824-25, 9828_

(Harris, Mayer). Nor did they visit all the facilities. Tr. 9829 (Mayer). As a result, their testimony on special facilities' administrators' attitudes towards planning and the existence (or lack) of facility-specific plans is given no weight by this Board.

404. Drs. Harris and Mayer also asserted that certain practical constraints make special facilities unable to shelter residents, chiefly that the sick and elderly will die if air conditioning systems are closed off during the summer for sheltering. Harris and Mayer, ff. Tr. 9777, at 17-18. Mr. Glaser, a nursing home administrator and consultant to LILCO, disagreed; he testified that with proper care, ventilation systems can be shut down without ill effects on residents. Tr. 9076 (Glaser). In addition, Drs. Harris and Mayer contended that (1) not all nursing homes in the EPZ are air-conditioned, (2) power outages in the summer make air conditioning unavailable at times, and (3) steps could be taken to prevent ill effects to residents during these times. Tr. 9787-88, 9790-91, 9901 (Harris, Mayer).

405. The Board finds that the LILCO Plan adequately describes the guidelines to be used in recommending selective sheltering and selective evacuation, and the procedure by which these recommendations would be implemented.

B. Wind Shifts (64)

406. In Contention 64 the Intervenor's allege that wind conditions on Long Island require LILCO to evacuate fully the population within at least a radius of five to seven miles from the plant in the event that any evacuation is advised. The LILCO Plan provides for evacuation of all zones within two miles of Shoreham, plus pie-shaped sections of zones outside the two-mile

radius, based upon the prevailing wind direction. The Intervenor's contend that nearby unevacuated zones may be exposed to health-threatening doses of radiation due to a sudden wind shift and that the Plan does not take that possibility into account, in violation of 10 C.F.R. §§ 50.47(a)(1) and (b)(10).

407. We disagree with the Intervenor's assertion that, regardless of conditions at the time of an accident, LILCO should be required to recommend an evacuation of at least a radius of five to seven miles whenever evacuation is recommended. Evacuation recommendations should be made for a particular portion of the EPZ based on circumstances at the time of an accident.

Cordaro et al., ff. Tr. 8760, at 37. A blanket evacuation recommendation for all persons within five to seven miles is not likely to be necessary and is not contemplated by NRC regulations. Cordaro et al., ff. Tr. 8760, at 37.

408. The average wind speed on Long Island, based on data from Suffolk County Air Force Base taken over 19 years, is eight miles per hour, Cordaro et al., ff. Tr. 8760, at 42, Att. 18; average wind speed from the Shoreham meteorological tower is 8-9 miles an hour, Tr. 8903 (Daverio). Shoreham is considered a coastal location, which has lower wind variability than an inland or valley location. Tr. 8957 (Cordaro). Even as compared to other coastal locations studied, Shoreham has a lower wind variation. Cordaro et al., ff. Tr. 8760, at 43, Att. 19.

409. On cross-examination of the LILCO witnesses, New York State questioned whether the "sea breeze" phenomenon would affect wind shift on Long Island. See Tr. 8958 (Zahnleuter).^{84/} "Sea breeze" refers to a

^{84/} The discussion of sea breezes continued over LILCO's objection that the subject was outside the scope of the contention. See Tr. 8958, 8960-61.

phenomenon at coastal sites where, as the land warms up relative to the water, the breeze blows in from the water over the land and perhaps upward. Tr. 8959 (Cordaro, Watts). The sea breeze phenomenon could occur on Long Island, both from the Atlantic Ocean and from Long Island Sound. Tr. 8961-62 (Cordaro).

410. The phenomenon has been studied in detail at both Brookhaven Laboratory and LILCO. Tr. 8962 (Cordaro). Effects of sea breeze versus sound breeze can be determined from the meteorological data gathered at the Brookhaven National Laboratory meteorological towers, Tr. 8963-64 (Daverio). The studies show that sea breeze might cause windshifts to occur somewhere five to six miles inland. Tr. 8963 (Daverio). If a sound breeze occurred at the site, it would be noted because it would affect the meteorological tower readings. Tr. 8969 (Daverio). Field survey teams will confirm the direction of the plume so that persons making protective action recommendations will know if there is a windshift for any reason, including sea breeze. Tr. 8964-65, 8972 (Watts). In making a protective action decision, the measured meteorological data as well as anticipated changes in weather conditions, including any shift, must be taken into account. Tr. 8975 (Daverio, Miele).

(footnote continued)

Notwithstanding the inclusion of information on sea breeze in these findings, LILCO still believes that the issue of sea breeze is beyond the scope of Contention 64.

411. In addition to wind shifts discussed in the contention, and sea breezes and their effect on wind shifts, discussed on cross-examination by New York State, the Board raised the question of wind shear. See Tr. 8976. Wind shear is a change in velocity or direction of the wind as it is measured at different altitudes. See Tr. 8976. The LILCO Plan takes into account as part of the dose assessment the point of release and the existing velocity relative to the horizontal wind velocity coming from the plant. Tr. 8977-79 (Watts).

412. The LILCO Plan bases protective action recommendations upon evacuation times, release direction and duration, sheltering factors, plant conditions, and other factors including information from field monitoring teams, meteorological data from the National Weather Service and Brookhaven National Laboratory, and the extensive resources available pursuant to the DOE RAP response. Cordaro et al., ff. Tr. 8760, at 38-40. The resulting protective action recommendation will apply to persons located in a "keyhole" made up of a 360° area circling the plant plus a downwind wedge of at least 67°, which takes into account possible wind shifts. Cordaro et al., ff. Tr. 8760, at 40; Tr. 8950 (Watts). Depending upon projected doses, the protective action recommendation will apply to one of the following areas:

(1) a two-mile radius from the plant; (2) a two-mile radius plus a five-mile downwind sector; or (3) a five-mile radius plus a 10-mile downwind sector. Plan, OPIP 3.8.2, Att. 5; Cordaro et al., ff. Tr. 8760, at 40. The two- and five-mile radial areas are included to take into account a possible shift in wind. Cordaro et al., ff. Tr. 8760, at 41.

413. In addition, as the zone map in the LILCO Plan at Appendix A, Figure 3 shows, zones affected by a five-mile evacuation actually go out to about seven miles except in Zone J; therefore, in many cases the Intervenor's suggestion of evacuation out to seven miles will occur under the LILCO Plan. Cordaro et al., ff. Tr. 8760, at 41.

414. Finally, efforts are continuously made to anticipate future wind direction change by consulting several different sources of weather forecast information. Cordaro et al., ff. Tr. 8760, at 42; Tr. 8920, 8921, 8945-46 (Watts), 8938-40, 8946 (Daverio), 8942-43 (Miele). When weather forecast information indicates to the emergency response team that the wind direction will change, the protective action recommendation is recalculated and, if necessary, a new protective action recommendation is issued. Cordaro et al., ff. Tr. 8760, at 41; Tr. 8952-53 (Miele).

C. Nomogram (49)

415. Contention 49 asserts that "the nomogram which relates iodine to total fission products for the calculation of thyroid dose" contained in OPIP 3.5.2, Attachment 11, is "not realistic," and therefore that there is no assurance that the nomogram will "provide reliable data for use in making protective action decisions," in violation of 10 C.F.R. § 50.47(b)(9). The contention reflects two issues raised in the FEMA RAC review of the LILCO Plan: (1) the nomogram is not always used to calculate the thyroid dose from radioactivity measured on the particulate filter paper, and (2) the thyroid dose determination might not be accurate due to filtration, moisture in the containment, and other removal processes.^{85/}

^{85/} Contention 49 was rewritten by the Licensing Board in its April 20, 1984 order ruling on LILCO's Motion for Summary Disposition of Contentions 24.B, 33, 45, 46, and 49.

416. Under the LILCO Plan, total thyroid dose can be projected using a calculation worksheet that directs the person performing the evaluation to the nomogram which is the subject of Contention 49. A nomogram is a mathematical tool that uses graphs to calculate the resulting total thyroid dose for the area in which the air sample was taken. Cordaro et al., ff. Tr. 13,909, at 9. The nomogram compensates for four different variables within the sampling process: (1) the iodine-to-total-fission-product ratio, (2) decay of isotopes after reactor shutdown, (3) any exposure to the public that has taken place prior to the actual field measurement, and (4) duration of exposure (the amount of time the population would be inhaling radioiodine from the plume, contributing to a thyroid dose). Cordaro et al., ff. Tr. 13,909, at 8.

417. Other tools would be used in conjunction with this method for formulating protective action recommendations, including consideration of plant conditions, the possibility of release, the potential amount of activity for release, and other dose projections performed based on the release rate from the plant, existing meteorological conditions, and field survey measurements. Tr. 13,911A-12 (Watts).

418. The FEMA RAC review noted two areas in which FEMA thought the nomogram was unrealistic. First, FEMA commented that without core damage, radioiodines may be collected on the particulate filter if the iodine is in elemental form. Therefore, it is conceivable that the activity measured on a particulate filter may be iodine. Second, FEMA commented that the amount of fission products collected from the core damage accidents is highly dependent on a number of parameters such as moisture, containment filtration of release, and other removal mechanisms that are not easily amenable to the nomogram

assumptions. It is for these reasons that the FEMA review and Contention 49 question whether the nomogram is realistic. Cordaro et al., ff. Tr. 13,909, at 9-10; Baldwin, ff. Tr. 14,292, at 45.

419. We find that as to the first concern, the nomogram does account for particulate iodine collected on the filter paper. The nomogram allows one to calculate how much of the measured radioactivity on the filter paper is due to particulate iodine at various points in time. The nomogram procedure then allows the total thyroid dose from gaseous and particulate iodine to be calculated. Cordaro et al., ff. Tr. 13,909, at 11-12, Att. 4.

420. The origin of the FEMA RAC review comment is that procedure OPIP 3.5.2 states in notes on pages 18 of 56 and 54 of 56 that unless there is core melt or fuel damage, it is not expected that there will be any iodine released in particulate form and therefore no iodine radioactivity will be found on the filter paper. These notes suggest that it is not necessary to calculate a thyroid dose from the filter paper measurement but only from the inner canister. As a result of FEMA's comment that even without core melt or fuel damage, radioiodine may be released and collected on the particulate filter paper, LILCO has committed to modify the procedure in future revisions to the LILCO Plan to remove the notes on pages 18 and 54, thus ensuring that the radioactivity measured on the filter paper will always be included in the thyroid dose calculation. Cordaro et al., ff. Tr. 13,909, at 12. With this modification, we find that the nomogram does account for particulate iodine that may be collected on the particulate filter paper.

421. As to the question of whether the nomogram is realistic, we find that it is. The determination of the radioiodine fraction of the fission product release is based upon analysis of a range of release scenarios for BWR accidents. The procedure uses a most probable iodine/total fission product ratio for the accident scenarios analyzed. Tr. 14,294 (Keller). The ratio used in OPIP 3.5.2 is the same ratio recommended in "Guidance on Offsite Emergency Radiation Measurement Systems," FEMA Rep 2, September 1980, in Appendix B, entitled "An Air Sampling System Developed by Brookhaven National Laboratory for Evaluation of the Thyroid Dose Commitment Due to Fission Products Released from Reactor Containment," Cordaro et al., ff. Tr. 13,909, at 7-8, Att. 2. The method used is also recommended in "Preparedness and Response in Radiation Accidents: U.S. Department of Health and Human Services," FDA 83-8211, Appendix H-4 (August, 1983). Cordaro et al., ff. Tr. 13,909, at 15, Att. 5. Because radioactive material detected on the filter paper is likely to include a mixture of iodine and non-iodine particulates that varies with time, the nomogram includes a correction step to account for this variation. The nomogram correction reflects the most probable ratio of particulate iodine to total particulates as a function of time. When filter canisters are later reanalyzed by a laboratory, the specific particulate mixtures present will be determined. In addition, the nomogram correction for particulate mixtures was based upon BWR accident scenarios that predict significant releases of radioactivity in particulate form (known as dry release cases). However, when other parameters are considered, such as containment moisture, filtration, and other physical chemistry conditions, these influences would have the effect of suppressing the release of particulate material. Little, if

any, iodine or non-iodine particulate material would therefore be likely to be detectable in the field. As a result, the particulate iodine component of any computed down-wind thyroid inhalation dose would be greatly decreased in magnitude. This would also diminish the significance of any uncertainty associated with the mixture of iodine and non-iodine particulates assumed to be present. Cordaro et al., ff. Tr. 13,909, at 13, 14.

422. Accordingly, we find that the method identified in the LILCO Plan for use of the nomogram will provide an accurate and dependable means of determining the thyroid dose to the exposed population during the early stages of an emergency when the determination and implementation of protective actions are most critical. In a slowly developing emergency where there is the potential for a release or where a radiological release takes place over a period of time after the reactor shutdown, protective actions would be recommended based upon factors that include plant conditions, in-plant radionuclide measurements, and environmental survey measurements. Thus, the LILCO Plan meets the standard in 10 C.F.R. § 50.47(b)(9).

IX. EVACUATION

A. Time Estimates (65, 23.C, 23.D, 23.H)

423. In Contentions 23.C, D, and H and 65, Suffolk County raises a variety of issues all related to the single question of whether the evacuation time estimates for the automobile-owning public contained in Appendix A to the LILCO Transition Plan are accurate and reliable. Contentions 23.C, D, and H address the effect of a hypothesized voluntary evacuation by persons living outside the EPZ on evacuation time estimates. Contention 65 questions

how differing assumptions about such factors as mobilization times, driver compliance with the proposed traffic routing and control scheme, and accidents and breakdowns will affect the accuracy of evacuation time estimates presented in Appendix A.

424. Direct cases on these contentions were presented by all parties. Cross-examination of these cases was conducted on nine hearing days: LILCO, January 17 to 19 and February 23 and 24, 1984, Tr. 2339-771, 3812-56; Suffolk County, January 24 to 26, 1984, Tr. 2914-3065, 3193-379; NRC Staff, January 26 and 27, 1984, Tr. 3431-603; FEMA, January 27, 1984, Tr. 3603-24; and New York State, February 23, 1984, Tr. 3697-807.^{86/}

^{86/} LILCO's prefiled and supplemental testimony on Contention 65 (hereinafter respectively, Cordaro *et al.* (Contention 65), ff. Tr. 2337 and Cordaro *et al.* (Contention 65, Supp. I), ff. Tr. 2337), and on Contentions 23.C, D, and H (hereinafter, Cordaro, *et al.* (Contention 23.C, D, and H), ff. Tr. 2337) was sponsored by Matthew C. Cordaro, John A. Weismantle, and Edward B. Lieberman; these witnesses testified as a panel. Supplemental testimony in response to New York State testimony on Contention 65 (hereinafter, Cordaro *et al.* (Contention 65, Supp. II), ff. Tr. 3857) was sponsored and testified to by Dr. Cordaro, Mr. Weismantle, Mr. Lieberman, and Dr. Mileti. FEMA's testimony on Contentions 23 and 65 was sponsored and testified to by Philip H. McIntire (hereinafter, McIntire, ff. Tr. 2086). Prefiled testimony on Contentions 65 and 23 on behalf of the NRC Staff was sponsored and testified to by Dr. Thomas Urbanik, II (hereinafter, Urbanik, ff. Tr. 3430). Suffolk County's direct testimony on Contentions 65 and 23.H (hereinafter, Roberts *et al.* (Contentions 65 and 23.H), ff. Tr. 2260) was sponsored by Deputy Chief Inspector Richard C. Roberts, Assistant Chief Inspector Joseph L. Monteith, Deputy Inspector Philip McGuire, Deputy Inspector Michael J. Turano, Jr., and Captain Edwin J. Michel. Additional testimony submitted on behalf of Suffolk County on Contentions 65 and 23.D was sponsored and testified to by Philip B. Herr (hereinafter, Herr, ff. Tr. 2909), Bruce William Pigozzi (hereinafter, Pigozzi, ff. Tr. 2909), and Peter A. Polk (hereinafter, Polk, ff. Tr. 2909). Mr. Pigozzi also submitted supplemental testimony on Contention 65 (hereinafter, Pigozzi (Contention 65, Supp.), ff. Tr. 2909). New York State's testimony on Contention 65 (hereinafter, Hartgen *et al.*, ff. Tr. 3695) was sponsored and testified to by Messrs. David T. Hartgen, Richard D. Albertin, Robert G. Knighton, and Foster Beach; these witnesses also testified as a panel.

425. For the reasons detailed below, this Board concludes that with the inclusion of evacuation time estimates for an "uncontrolled" scenario in the LILCO Transition Plan (see Finding 195 above), the Plan contains reasonably accurate evacuation time estimates that can be relied on in making protective action recommendations. Accordingly, LILCO's evacuation time estimates comply with the requirements of 10 C.F.R. § 50.47 and NUREG-0654. In addition, this Board also concludes, based on our previous findings (see Section I.A above), that the inclusion of evacuation time estimates for a hypothetical voluntary evacuation by persons living outside the EPZ and never entering the EPZ during their travel would not further the emergency planning goal of providing realistic, accurate evacuation time estimates. Indeed, our review of LILCO's evacuation time estimates for the population inside the EPZ, under the alternate hypotheses that 25% and 50% of the population outside the EPZ will voluntarily evacuate, has convinced us that Suffolk County's perceived concerns about the effect of a shadow phenomenon are more academic than practical. Such hypothetical voluntary evacuation from areas outside the Shoreham EPZ would have relatively minor effects on total evacuation time estimates for people living within the EPZ.

426. As background, and contrary to Suffolk County's assertions, the Shoreham EPZ does not pose uniquely difficult circumstances for emergency planning purposes. Appendix A to the LILCO Transition Plan contains background information about emergency planning in the 10-mile EPZ around Shoreham. Some of the salient background facts are: half of a 10-mile circle around the plant (roughly the northern semicircle) lies in the open water of Long Island Sound. The projected 1985 EPZ population of 138,500 (winter)

and 160,000 (summer) is concentrated primarily to the west and southwest of Shoreham. Significant portions of the EPZ, particularly to the south and east, consist of park, conservation areas, or large, lightly populated scientific and industrial establishments (Brookhaven National Laboratory and Grumman). Prevailing winds are toward the northern semicircle (i.e., off-shore) over 30% of the time, and toward the lightly populated eastern parts of the EPZ approximately another 35% of the time. The topography of the island is generally flat, with only small hills and bluffs along the northern shore. The highway system is good, containing controlled access highways including the Long Island Expressway (three lanes plus shoulder in each direction) and Sunrise Highway (two lanes plus shoulder in each direction) and several other east-west arterial roads. Cordaro et al. (Contention 65), ff. Tr. 2337, at 17-18; Tr. 2755-59 (Lieberman).

427. The computational tool used by LILCO's consultant, KLD, Inc. to produce the evacuation time estimates contained in Appendix A to the LILCO Plan is a three-model system known as DYNEV. In general, DYNEV consists of three major components:

- 1) an equilibrium traffic assignment model,
- 2) a capacity model, and
- 3) a traffic simulation model.

Cordaro et al. (Contention 65), ff. Tr. 2337, at 19. The traffic assignment model identifies the best evacuation route between each origin/destination pair. The best route is defined as one that minimizes the travel time from each origin to each associated destination along the network under the prevailing traffic conditions. Id. at 21. The capacity model estimates the

permissible service volumes -- defined in vehicles capable of being served per hour -- for each traffic movement on each roadway section or link. Id. at 21-22. The traffic simulation model provides a detailed description of traffic operations on the entire evacuation network over time. Id. at 22-23.

428. The evacuation time estimates presented in Appendix A of the LILCO Plan were the result of a detailed, time-consuming process. First, considerable work was required to obtain the extensive input information needed by the DYNEV system. See Cordaro et al. (Contention 65), ff. Tr. 2337, at 25-26. Input data were obtained from a variety of sources including the Suffolk County Planning Department, a survey of all roadways in the EPZ by KLD and a study of average queue discharge headways at major intersections throughout the EPZ. Id. at 33-34. Next, the traffic assignment and traffic simulation models of the DYNEV system were iteratively executed to refine trip assignments, and hence lower total evacuation times, by identifying bottlenecks and means to reduce their effects within practical limits. See id. at 35-39. This iterative process is in keeping with the analytic techniques for estimating evacuation times recommended in NUREG/CR-1745. Id. at 35-36.

429. In all, evacuation time estimates for twenty-one evacuation scenarios are presented in Appendix A of the LILCO Transition Plan. These cases are responsive to the FEMA/NRC Guidelines outlined in NUREG-0654, Rev. 1, Appendix 4, page 4-4. See Cordaro et al. (Contention 65), ff. Tr. 2337, at 41; Urbanik, ff. Tr. 3430, at 6. In addition to these required studies, LILCO also commissioned a series of studies that considered a variety of alternative assumptions suggested by Contentions 23 and 65, including (1)

voluntary evacuation from areas outside the EPZ, (2) the presence of accidents during an evacuation, (3) the absence of special traffic control tactics during an evacuation (i.e., an "uncontrolled" evacuation), (4) the deviation of evacuees from their recommended paths (i.e., "non-compliance cases"), and (5) the construction of an additional potential evacuation route on an existing LILCO right-of-way. Cordaro et al. (Contention 65), ff. Tr. 2337, at 41-44. The results of these studies were reported in Attachment 6 to LILCO's testimony on Contention 65. Cordaro et al. (Contention 65), ff. Tr. 2337, Att. 6, reproduced here as Table 1.

TABLE 1
EVACUATION TIME ESTIMATES

CASE	1/ ZONES 2/ EVACUATED	SEASON	WEATHER	CONTROLLED/ UNCONTROLLED	COMPLIANCE/ NON-COMPLIANCE	10-20 MILE SHADOW	OTHER FACTORS CONSIDERED	EVACUATION TIME 3/ (Hours-Minutes) PERCENT OF POPULATION EVACUATED		
								50%	90%	100%
1	E-2	summer	normal	controlled	compliance	0%		1-30	2-30	3-15
2	E-5	summer	normal	controlled	compliance	0%		1-35	3-00	4-10
3	E-10	summer	normal	controlled	compliance	0%		1-35	3-00	4-15
4	W-2	summer	normal	controlled	compliance	0%		1-30	2-30	3-35
5	W-5	summer	normal	controlled	compliance	0%		1-45	3-10	4-15
6	W-10	summer	normal	controlled	compliance	0%		1-55	3-45	4-55
7	C-2	summer	normal	controlled	compliance	0%		1-30	2-25	3-35
8	C-5	summer	normal	controlled	compliance	0%		1-35	2-50	4-00
9	C-10	summer	normal	controlled	compliance	0%		1-40	3-00	4-20
10	All-2	summer	normal	controlled	compliance	0%		1-35	2-35	3-35
11	All-5	summer	normal	controlled	compliance	0%		1-50	3-20	4-20
12	All-10	summer	normal	controlled	compliance	0%		2-00	3-40	4-55
13	E-10	winter	inclement	controlled	compliance	0%		1-45	3-10	4-15
14	E-10	summer	inclement	controlled	compliance	0%		1-50	3-25	4-45
15	W-10	winter	inclement	controlled	compliance	0%		2-10	4-45	6-00
16	W-10	summer	inclement	controlled	compliance	0%		2-10	4-25	6-20
17	C-10	winter	inclement	controlled	compliance	0%		1-50	3-30	5-15
18	C-10	summer	inclement	controlled	compliance	0%		1-55	3-30	4-55
19	All-10	winter	inclement	controlled	compliance	0%		2-20	4-40	6-00
20	All-10	summer	inclement	controlled	compliance	0%		2-20	4-25	6-20

CASE	ZONES EVACUATED	SEASON	WEATHER	CONTROLLED/ UNCONTROLLED	COMPLIANCE/ NON-COMPLIANCE	10-20 MILE SHADOW	OTHER FACTORS CONSIDERED	EVACUATION TIME (Hours-Minutes) PERCENT OF POPULATION EVACUATED		
								50%	90%	100%
21	All-10	summer	normal	controlled	compliance	0%	3-hr loading	2-15	3-50	4-55
22	All-10	summer	normal	controlled	compliance	25%		2-15	4-00	5-15
23	All-10	summer	normal	controlled	compliance	50%		2-20	4-55	6-35
24	All-10	summer	normal	uncontrolled	compliance	0%		2-15	4-10	6-30
25	All-10	winter	inclement	uncontrolled	compliance	0%		2-30	4-45	7-55
26	All-10	summer	normal	uncontrolled	compliance	25%		2-45	5-10	7-00
27	All-10	summer	normal	uncontrolled	compliance	50%		3-10	5-55	7-35
28	All-10	winter	inclement	uncontrolled	compliance	50%		4-55	7-45	10-05
29	All-10	summer	normal	controlled	compliance	0%	4 accidents	2-00	3-40	4-55
30	All-10	summer	normal	controlled	compliance	0%	4 accidents	2-00	3-40	4-55
31	All-10	summer	normal	controlled	non-compliance 25%	0%		2-00	3-45	4-55
32	All-10	summer	normal	controlled	non-compliance 50%	0%		2-00	3-50	5-30
33	All-10	summer	normal	uncontrolled	non-compliance 25%	0%		2-15	3-55	6-30
34	All-10	summer	normal	uncontrolled	non-compliance 50%	0%		2-15	4-00	6-30
35	All-10	summer	normal	controlled	compliance	0%	right-of-way	2-00	3-30	4-30
36	All-10	summer	normal	uncontrolled	compliance	0%	right-of-way	2-00	3-30	4-30

1/ Cases 1- 21 are reported in Appendix A; Cases 22-30 are reported in TM-77; and Cases 31-36 are reported in TM-140. For the convenience of all parties, the cases that appear in this table have been renumbered for ease in referencing. Thus, these case numbers will not correspond to the case numbering system used in the three listed reports.

2/ Codes in terms of "90° Quadrants - Miles," where E = East, C = Central, W = West and A = All quadrants.

3/ "Evacuation time" is defined as the elapsed time from the first notice to evacuate to the passage of the last car out of the EPZ.

430. Intervenors raised three basic concerns with regard to the methodology used by KLD to calculate evacuation time estimates. First, Suffolk County witness Pigozzi argued that use of an equilibrium assignment model was inappropriate for evacuations because such a model relies on assertedly inapplicable "normal" driver responses developed over a lengthy period of time. Pigozzi, ff. Tr. 2909, at 30-33. Second, New York State witnesses expressed concerns about the capacities used in KLD's analyses, arguing that they were incompatible with information in the Highway Capacity Manual or available New York State capacity data. Hartgen et al., ff. Tr. 3695, at 5, 7-11. Third, New York State witnesses contended that KLD had not validated^{87/} its time estimates using data specific to Suffolk County or data from an actual evacuation. Hartgen et al., ff. Tr. 3695, at 5-6. These concerns are not justified and do not invalidate the methodology used by KLD.

431. Application of equilibrium assignment is valid whenever motorists traveling on a capacity-constrained roadway network select routes so as to minimize their travel time. See Cordaro et al. (Contention 65), ff. Tr. 2337, at 23-24. Motorists will select these minimum time routes either by responding to information acquired by observation over time in a stable traffic environment as suggested by Dr. Pigozzi, see Pigozzi, ff. Tr. 2909, at 32, or by relying on an external information source when traffic conditions vary with time or depart from historical patterns, such as during an evacuation.

^{87/} For clarity, this Board will adopt LILCO's definitions for calibration and validation. "Calibration" will be used to describe the process of accumulating the necessary input data for running a model, while "validation" will be used to describe the process by which the accuracy of a model's results is tested. Cordaro et al. (Contention 65, Supp. II), ff. Tr. 2957, at 15-16. These definitions were generally agreed with by the other parties.

Tr. 2475-80 (Lieberman). Since the public will be informed of recommended evacuation routes in a variety of ways, see Tr. 2437-40 (Lieberman), the use of an equilibrium model to identify these routes is appropriate.

432. In planning for an evacuation during a radiological emergency, one goal is to estimate the ability of an existing roadway system to accommodate expected demand. Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 9. The Highway Capacity Manual, which provides one methodology for estimating capacities and is advocated by New York State, was published in 1965, is outdated in a variety of respects, and is in the process of being replaced. Id. at 10; see Tr. 3711-12 (Hartgen). The procedures used by KLD to estimate capacity are consistent with those which will be presented in the new capacity manual. Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 11. The 1965 Highway Capacity Manual's usefulness is further limited since it was designed to represent typical, rather than specific, circumstances, particularly where, as here, more specific capacity estimates are available. Id. at 10. Thus, the use of the Highway Capacity Manual advocated by New York State witnesses has limited utility in developing evacuation time estimates. Similarly, available New York State data, also advocated by New York State, are of limited value, even on roads covered, since they contain only estimates of normal traffic demand and not of highway capacity. See id. at 9-10; Tr. 3736-39 (Hartgen). It must be noted that New York State stands alone in its criticism of the roadway capacities used in LILCO's time estimates. NRC's witness Urbanik agreed with the reasonableness of those capacities. Tr. 3434-35 (Urbanik). Suffolk County's independent analysis of evacuation times contained, in most cases, higher estimates of

roadway capacities than LILCO. Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 8, Att. 1.

433. With regard to New York State's concerns about the validation of the DYNEV system, these concerns are simply misplaced. These concerns are premised on transportation planning models which are used to forecast future conditions using statistical approaches. By contrast, the intrinsic relationships contained in the DYNEV model and used to estimate evacuation times reflect driver behavior, which is largely invariant with time. Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 17-18. The major components of the DYNEV system have been validated using rigorous statistical testing methodology. Cordaro et al. (Contention 65), ff. Tr. 2337, at 33; see also Urbanik, ff. Tr. 3430, at 7. In addition, the DYNEV system was calibrated using information on driver behavior that was specific to the Shoreham EPZ. Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 20. Validation of the DYNEV system using Suffolk County traffic data under normal traffic conditions would be costly and would, in any event, still be subject to criticism as using a data base which did not reflect evacuation conditions. Id. at 18-19. Validation using other evacuation data is simply infeasible since no such data base has been shown to exist. Id. Thus, validation of the DYNEV system using Suffolk County-specific data would produce no measurable benefits; validation using actual evacuation data cannot be done.

Time to Prepare to Evacuate (65.A)

434. Suffolk County argues in Contention 65.A that complete mobilization of the public will take from "one to more than three hours," and that, therefore, LILCO's 20-minute mobilization period is grossly in error. To a

large degree, Suffolk County's argument is semantic. Mobilization time within the context of the LILCO Transition Plan is defined as the elapsed time between the issuance of the notice to evacuate and the time that the first person within the EPZ begins an evacuation journey from his home or place of business to a location outside the EPZ. Cordaro et al. (Contention 65), ff. Tr. 2337, at 47. By contrast, Contention 65.A presumptively defines "mobilization time" as the elapsed time from the first notice to evacuate to the time the last person has begun his evacuation trip. Herr, ff. Tr. 2909, at 6; Pigozzi, ff. Tr. 2909, at 9. The LILCO modeling runs clearly recognize that all but the very first evacuee from the EPZ will require more than 20 minutes to begin their evacuation journeys.^{88/} The evacuation time estimates presented by LILCO assume, in all but one case, that trip generation and loading of the network will continue for a period of two hours following the time the first individual begins his evacuation trip. Thus, everyone is assumed to have begun their evacuation journeys by 2 hours 20 minutes after the issuance of the advisory to evacuate -- not 20 minutes, as the contention appears to assume. Cordaro et al. (Contention 65), ff. Tr. 2337, at 47-49; see Herr, ff. Tr. 2909, at 7.

435. Accordingly, the factual dispute with regard to Contention 65.A is whether a trip generation period of 2 hours 20 minutes is appropriate, or whether a longer (see Herr, ff. Tr. 2909, at 18; Pigozzi, ff. Tr. 2909, at 17)

^{88/} To avoid confusion about the two definitions used for the term "mobilization time" in Contention 65, and the slightly different use of the term in Contention 27, the Board will, hereafter, refer to the elapsed time from the notice to evacuate to the time the last person begins his evacuation trip as the "trip generation period."

or shorter (see Hartgen et al., ff. Tr. 3695, at 11) period is more appropriate. As will be demonstrated below, the debate over the appropriate trip generation period is academic; none of the range of periods proposed by the parties has a measurable impact on evacuation time estimates. See Tr. 3440 (Urbanik).

436. The original source of the 20 minute "mobilization" period and subsequent two-hour trip generation period used in LILCO's evacuation time estimates was the Suffolk County Planning Department's work in 1981 and early 1982. Cordaro et al. (Contention 65), ff. Tr. 2337, at 49. In addition, in the fall of 1982, KLD Associates, on behalf of LILCO, commissioned a survey by the National Center for Telephone Research (NCTR) to obtain detailed information describing the travel patterns, household structures and vehicle availability of the population residing within the EPZ. Id. at 50-51.

437. The results of the NCTR survey and additional information on daily transportation schedules for school children were used by KLD to produce a detailed, independent analysis of the time distributions for the pre-evacuation preparatory events identified in Figure 4 of Appendix 4 of NUREG-0654. Cordaro et al. (Contention 65), ff. Tr. 2337, at 51, Att. 10. These preparatory events include notification, preparation to leave work, travel from work to home, and preparation to leave home. Id. A review of this information, id., Att. 10, Fig. 1, supports the reasonableness of the Suffolk County Planning Department's work and the 2 hour 20 minute trip generation period.

438. Suffolk County's testimony on Contention 65.A did not attempt to present an independent factual basis for a different trip generation period

than that presented by LILCO. Instead, Suffolk County witnesses confined their testimony largely to criticisms of the factual bases for the County's own earlier work. Herr, ff. Tr. 2909, at 14-19; Pigozzi, ff. Tr. 2909, at 17-18. Suffolk County's direct testimony did, however, implicitly include an estimate of the trip generation period as part of Mr. Polk's analysis of evacuation time estimates -- evacuation times estimates that were cited with approval by Mr. Herr, see Herr, ff. Tr. 2909, at 54. This trip generation period approximates the 2 hour 20 minute period used in LILCO's evacuation time analyses. Cordaro et al. (Contention 65, Supp. 1), ff. Tr. 2337, at 9-10; Cordaro et al. (Contention 65), ff. Tr. 2337, Att. 10, Fig. 1, 3.

439. In addition to these comparisons of trip generation periods, KLD also conducted a sensitivity study using a longer, 3 hour 20 minute trip generation period. Table 1, Case 21. The results of this study demonstrate that if the trip generation period is increased by one hour there is no effect on the total time required to evacuate the EPZ. This result is reasonable if one recognizes that during most of an evacuation, traffic demand will exceed roadway capacity on many parts of the EPZ roadway network, creating saturated flow conditions. Cordaro et al. (Contention 65), ff. Tr. 2337, at 53-57. Under saturated flow conditions, roadway capacity rather than the trip generation period controls the total evacuation time; thus, increases in the trip generation period will not lengthen evacuation times until the two approach equivalence. Id.; see also Urbanik, ff. Tr. 3430, at 10.

440. This same principle applies to New York State witnesses' concerns about a shorter trip generation period -- a so-called traffic surge. If a trip generation period of less than 2 hours 20 minutes were assumed, capacity

would still limit evacuation times and as a result, evacuation times would probably not be changed, and if changed, would most likely be reduced.

Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 14-15; Tr. 2734-35 (Lieberman).

Mobilization Traffic (65.B)

441. Suffolk County Contention 65.B asserts that mobilization traffic will cause congestion, which will lengthen evacuation times. Suffolk County witnesses Herr and Pigozzi have argued that LILCO's evacuation time estimates have failed to account for congestion caused by "pre-evacuation" trips. Herr, ff. Tr. 2909, at 18; Pigozzi (Contention 65, Supp.), ff. Tr. 2909, at 10.^{89/} LILCO has argued that these "pre-evacuation" trips are unlikely to affect its evacuation time estimates, since the vast majority of these trips occur prior to the onset of congestion. Cordaro et al. (Contention 65), ff. Tr. 2337, at 58-59.

442. It was generally agreed that preparatory trips are likely to fall into two general categories:

1. Trips taken to unite the family unit at home; and
2. other trips taken by members of the family unit prior to initiating the evacuation trip.

Cordaro et al. (Contention 65), ff. Tr. 2337, at 58; Herr, ff. Tr. 2909, at 18; Pigozzi, ff. Tr. 2909, at 10. Work-to-home trips are likely to constitute the largest portion of these preparatory trips. Cordaro et al. (Contention

^{89/} Other Suffolk County testimony on Contentions 27 and 67 contradicts, to some degree, the statements made by Mr. Herr and Dr. Pigozzi during the litigation of Contention 65 on the magnitude and timing of these "pre-evacuation" trips. See Findings 183, 512.

65), ff. Tr. 2337, at 58. These trips can potentially restrict service volume and perhaps increase evacuation times, if evacuation traffic demand approaches the roadway capacity (i.e., congestion begins to occur), and pre-evacuation traffic seeks to turn across heavy flows of evacuation traffic. See Cordaro et al. (Contention 65), ff. Tr. 2337, at 58; Urbanik, ff. Tr. 3430, at 11; Pigozzi, ff. Tr. 2909, at 10.

443. For an evacuation of the entire EPZ, congested conditions begin to occur approximately 1 hour after the notice to evacuate is given. Cordaro et al. (Contention 65), ff. Tr. 2337, at 58. LILCO's testimony indicates that between 87% and 93% of the work-to-home trips are completed by the time demand begins to reach roadway capacity. Id., Att. 10, Fig. 3. Figure 3 of Dr. Pigozzi's testimony yields a comparable value. See Pigozzi (Contention 65, Supp.), ff. Tr. 2909, Fig. 3. It can therefore be concluded that any interaction between work-to-home travel and evacuation travel should be limited in extent, and as NRC Staff witness Urbanik notes, those interactions should not disrupt evacuation movement given the slow speed of the evacuating traffic. See Urbanik, ff. Tr. 3430, at 11; Tr. 3441-43 (Urbanik).

444. Other trips undertaken by members of the family unit that are "preparatory" in nature will probably take place outside the EPZ and thus not affect evacuation times. This conclusion is premised on the realization that:

1. Most retail establishments within the EPZ would probably close shortly after the sirens are activated and well before evacuation travel becomes heavy;
2. the public will recognize that equivalent establishments are plentiful in western Suffolk and Nassau Counties;
3. the public will seek to avoid unnecessary delays within the EPZ; and

4. radio broadcasts will urge evacuees to proceed promptly out of the EPZ.

Cordaro et al. (Contention 65), ff. Tr. 2337, at 59.90/

Traffic Control Plan (65.C)

445. In Contention 65.C, Suffolk County argues that the traffic control plan presented in Appendix A will cause congestion and hence increase evacuation times. Suffolk County lists four reasons why, in its view, the traffic control plan will have this effect:

1. LERO traffic guides will screen people moving in directions contrary to prescribed routes;
2. traffic control tactics may cause aggressive behavior;
3. traffic guides may give directions contrary to traffic signals; and
4. people may not perceive the recommended routes as the most expeditious way out of the EPZ.

As will be discussed below, the record indicates that these concerns are meritless.

446. The primary importance of a traffic control plan is that it provides an opportunity for reducing evacuation times, thereby lowering the

90/ Suffolk County witnesses Herr and Pigozzi argued strongly that people would make preparatory trips to banks, stores and gasoline stations. Herr, ff. Tr. 2909, at 10-11; Pigozzi, ff. Tr. 2909, at 10. These arguments are, however, contrary to other testimony presented by these witnesses and other Suffolk County witnesses. That testimony includes assertions that evacuees will disobey all rules of the road in their haste to evacuate the EPZ and that a number of evacuees will run out of gas, presumably because they have failed to make pre-evacuation trips to gasoline stations, Tr. 3374-75 (Michel); Polk, ff. Tr. 2909, at 13. This testimony, which arguably presumes a rapid flight from the EPZ, is directly opposite to the reasoned, lengthy preparatory actions contemplated by Messrs. Herr and Pigozzi.

prospects of exposure of the public to radiation. Cordaro et al. (Contention 65), ff. Tr. 2337, at 74. The presence of LERO guides and trailblazer signs helps to provide assurance to the evacuating public that they are under the protection of a controlled evacuation plan that has been carefully developed in their best interest. See id. at 60, 61. The model runs performed for the Shoreham EPZ have shown that the traffic control plan provides important benefits in terms of reduced evacuation travel times relative to a situation in which no operational plan is in effect. Id. at 74-75. The results of these studies indicate that a controlled evacuation decreases the total evacuation time by 1 hour 35 minutes under normal weather conditions and by 1 hour 55 minutes under inclement winter weather conditions. Id. at 62, Att. 6; Table 1, compare Cases 12 and 24 and Cases 19 and 25.

447. The Board notes that the traffic management and control plan contained in Appendix A to the LILCO Transition Plan is not required by NUREG-0654. Section II.J.i. of NUREG-0654 merely requires that each plan "shall contain time estimates for evacuation within the plume exposure EPZ." Thus, NUREG-0654 does not require the optimization of evacuation time estimates. LILCO's attempt to reduce evacuation times through the use of a detailed traffic control plan is another example of the steps LILCO has taken to protect the public health and safety.

448. Suffolk County witnesses Roberts et al. questioned whether the traffic control plan can be implemented. They raised a number of concerns about the control tactics that are applied at individual intersections and the number of traffic guides that will be provided to carry them out. See Roberts et al. (Contention 65 and 23.H), ff. Tr. 2260, at 17-20. The impact

of these alleged deficiencies can be understood only by placing them in their proper perspective. The planning effort that produced Appendix A began with the development of a trip table which matched each origin with suitable destinations. Cordaro et al. (Contention 65), ff. Tr. 2337, at 36. The traffic assignment and traffic simulation models were then executed using this trip table to produce results which identified bottlenecks where substantial delays could occur. Id. at 37. Engineering judgment was then used to modify the trip table and/or to apply traffic control treatments to reduce travel time by eliminating or limiting the effect of such bottlenecks. Id. at 64-65. This process was repeated until a solution was reached that provided the minimum evacuation time. Tr. 2425-29, 2440 (Lieberman). This iterative process yielded a series of traffic movements which, if followed, would produce the evacuation times that appear in Appendix A. The traffic control plan presented in Appendix A was developed largely to ensure that the traffic movements designated by this planning effort would actually occur during an evacuation. A detailed review of the specific assertions of Roberts et al. show that a vast majority of the traffic control posts described in Figure 8 of Appendix A will effectively implement the traffic movements recommended by the DYNEV system. The Suffolk County witnesses identified a small group of posts where Appendix A does not properly describe the needed control tactics. Roberts et al. (Contentions 65 and 23.H), ff. Tr. 2260, at 18-19; see also Tr. 2679-87 (Lieberman). In other cases, Mr. Lieberman pointed out that Suffolk County witnesses' concerns were based on misinterpretations of Appendix A. See, e.g., Tr. 2691-93 (Lieberman). With regard to the posts where descriptions were inaccurate, LILCO will make the necessary revisions

to the traffic control plan. See Tr. 2686-87 (Lieberman). Accordingly, Suffolk County's concerns have been addressed.

449. Revisions to the LILCO Plan have removed all reference to traffic guides "screening" people traveling in other than prescribed movements. Co. Jaro et al. (Contention 65), ff. Tr. 2337, at 76; see also Roberts et al. (Contention 65), ff. Tr. 2260, at 53. Instead, LERO traffic guides will discourage traffic from entering the EPZ and from deviating from recommended movements by using hand and arm signals and by deploying traffic cones. Cordaro et al. (Contention 65), ff. Tr. 2337, at 62. Thus, the concern in Contention 65.C.1 about the number of traffic guides at each traffic control post is without basis.

Aggressive Drivers (65.C.2)

450. In Contention 65.C.2, Suffolk County alleges that motorists may exhibit "aggressive behavior" due to fear of radiation or confrontations with LERO traffic guides, resulting in increased congestion. We find this contention without merit. As described in more detail in response to Contention 23 on "shadow phenomenon," the notion that people become aggressive in emergencies is unfounded, because consensus is created in a community emergency, not conflict. See Tr. 3450-51 (Urbanik); Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 25-27. Motorists will look to LERO workers for help, not to treat them with hostility. Cordaro et al., ff. Tr. 1470, at 129; Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 27; Urbanik, ff. Tr. 3430, at 12; see Urbanik, ff. Tr. 3430, at 11. In addition, LERO workers will not "screen" motorists or force them to go in a particular direction. Cordaro et al., ff. Tr. 1470, at 129; McIntire, ff. Tr. 2086, at 3.

Consequently, motorists are unlikely to exhibit "aggressive behavior" that would result in increased congestion.

451. As LILCO witness Lieberman testified, motorists often have occasion to encounter situations where temporary traffic control measures may conflict with existing control measures. Cordaro et al. (Contention 65), ff. Tr. 2337, at 63. Common sense, experience, and behavioral literature all indicate that directions given by qualified traffic guides to facilitate traffic flow will be obeyed by all or virtually all motorists. Id. at 77-78. Nevertheless, LILCO conservatively reduced capacities by 15% to account, in part, for driver uncertainty about conflicting signals. Id. at 63; see Tr. 3446 (Urbanik). Thus, Contention 65.C.3 is without basis.

452. Suffolk County's witnesses raised a variety of general concerns about people varying from their assigned routes. People's perceptions of the most expeditious way out of the EPZ are unlikely to vary from the routes depicted on pages IV-75 to IV-165 of Appendix A. See Tr. 3436-38 (Urbanik). As all parties have generally agreed, people will be strongly motivated to leave the EPZ by the most expeditious route during an evacuation. Cordaro et al. (Contention 65), ff. Tr. 2337, at 65; Roberts et al. (Contention 65 and 23.H), ff. Tr. 2260, at 14; Herr, ff. Tr. 2909, at 20; Pigozzi, ff. Tr. 2909, at 22. This motivation, reinforced and guided by a public information program that informs the public as to the best routes under evacuation conditions for achieving their goal, and further reinforced by traffic guides and trailblazer signs that are consistent with that information, should result in a high level of route compliance. Cordaro et al. (Contention 65), ff. Tr. 2337, at 65-66. In addition, contrary to the suggestions of Suffolk County witness

Pigozzi, routing was predicated on evacuating EPZ residents along "minimum time" paths. Id. at 64. This assignment was subject to two constraints: first, in some cases alternate paths nearly as direct as the shortest path were chosen to disperse traffic and thus reduce travel times; and second, evacuation paths were derived so as not to take evacuees substantially closer to the power plant, in keeping with NUREG-0654 guidelines. Id. at 66; Tr. 2437-40 (Lieberman).

453. In addition to arguing that people would not deviate from their assigned routes, LILCO also tested the sensitivity of evacuation time estimates to route compliance. In those studies, 25% and 50% of the evacuating population were assumed to deviate from their recommended paths during both "controlled" (LERO traffic guides and trailblazer signs in place) and "uncontrolled" (no LERO workers or trailblazer signs; ordinary traffic signals) evacuations. For the case of a "controlled" evacuation, if 25% of the population diverted from their recommended paths, the evacuation time would not be affected (compare Table 1, Cases 12 and 31); if the level of non-compliance increased to 50%, there would be an increase of 35 minutes in the time required to evacuate the entire EPZ (compare Table 1, Cases 12 and 32). For the case of an uncontrolled evacuation, neither 25% nor 50% non-compliance would have an effect on total evacuation time (compare Table 1, Cases 12 and 33 and Cases 12 and 34, respectively). Cordaro et al. (Contention 65), ff. Tr. 2337, at 68-69.

454. The primary reason for the insensitivity of evacuation times to route compliance is because trade-offs occur among evacuation routes. These trade-offs do not produce evacuation times longer than those for the area that

is calculated to take the longest to evacuate -- the area lying west of the plant and north of Route 25A. In this area, there are relatively few reasonable paths alternate to those depicted in Appendix A. Therefore, the effect of non-compliance in this area tends to be limited. Cordaro et al. (Contention 65), ff. Tr. 2337, at 69-73. Thus, the concerns of Suffolk County witnesses about the effects of route non-compliance, see Herr, ff. Tr. 2909, at 20, 27-28; Roberts et al. (Contention 65), ff. Tr. 2260, at 14; Pigozzi (Contention 65, Supp.), ff. Tr. 2909, at 19-20, are speculative and are refuted by the only quantitative material in the record on the issue.

Potential Roadway Blockages (65.D)

455. In Contention 65.D, Suffolk County argues that proper consideration of a variety of potential roadway blockages would increase LILCO's evacuation time estimates. In particular, Suffolk County alleges that LILCO has failed to consider the effect of accidents and breakdowns that are likely to occur during an evacuation, the absence of shoulders on some primary and secondary routes, road construction that may be underway at the time of a radiological emergency, and the possible abandonment of vehicles under emergency conditions.

456. The existing documentation describing accidents and breakdowns that occur during large scale evacuations of the general public from areas at risk is very limited. There are, however, two documents which provide useful information of the subject:

U.S. Environmental Protection Agency Report
EPA-520/6-74-002, entitled "Evacuation Risks - An
Evaluation" by Joseph Hans, Jr. and Thomas Sell,
published in June 1974;

"Hurricane Carla" prepared by M.E. Treadwell and
published by the Department of Defense, Office of
Civil Defense in 1962.

Both reports indicate that accident rates during an evacuation are lower than the national average under normal conditions. Cordaro et al. (Contention 65), ff. Tr. 2337, at 79.

457. Surprisingly, national accident statistics became the subject of much controversy on this issue. LILCO witnesses testified that national accident statistics for 1980 indicate that accidents occur at a rate of approximately one per every 77,000 vehicle-miles. Cordaro et al. (Contention 65), ff. Tr. 2337, at 81. Since an evacuation of the entire Shoreham EPZ would involve approximately 304,000 vehicle-miles of travel, approximately 4 accidents would be predicted. Id.; see also Urbanik, ff. Tr. 3430, at 13. Given the slow speeds at which these predicted accidents may occur, they would not necessarily result in disabled vehicles that would cause roadway blockages. Cordaro et al. (Contention 66), ff. Tr. 6685, at 8. On the other hand, Suffolk County witness Polk predicted that 141 accidents would occur during an evacuation of the Shoreham EPZ. Polk, ff. Tr. 2909, at 10-12. In producing this higher estimate, Mr. Polk argued that the national accident statistics cited by LILCO show that accident rates are much higher at low speeds than at higher ones. Polk, ff. Tr. 2909, at 11; Pigozzi, ff. Tr. 2909, at 40-42; Herr, ff. Tr. 2909, at 41-42. Since evacuation speeds will average less than 10 miles per hour, Mr. Polk concluded that 141 rather than four accidents are likely to occur. Polk, ff. Tr. 2909, at 11-12.

458. A review of Mr. Polk's cited basis for his accident frequency estimate, the Transportation and Traffic Engineering Handbook, see Cordaro et al. (Contention 65, Supp. 1), ff. Tr. 2337, Att. 4, and its underlying report, entitled Solomon, "Accidents on Main Rural Highways Related to Speed,

Driver, and Vehicle," July 1964, LILCO Ex. 9, clearly shows that Mr. Polk's accident calculations proceed from the faulty assumption that the figures presented in the Handbook display accidents in terms of actual roadway speeds. Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 24-27; Tr. 3447-49 (Urbanik). Instead, the figures present accident rates in terms of speed deviations from average highway speeds. Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 26. Thus, the high frequency of accidents at low speeds cited by Mr. Polk represent people traveling at speeds far below the speed of the rest of the traffic stream. See Tr. 3448 (Urbanik); Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 25. These same statistics indicate that accident rates are lowest for those vehicles traveling at speeds that approximate the average of the traffic stream. Accordingly, these references, if used properly, would predict 3 or 4 accidents during an evacuation of the entire Shoreham EPZ where all traffic will be moving at very slow speeds. Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 26-27.

459. Suffolk County witness Polk also estimated that 277 cars are likely to run out of gas during an evacuation of the 10-mile EPZ. Polk, ff. Tr. 2909, at 12-16. LILCO witness Lieberman argued that this estimate was overstated because of outdated fuel consumption data used by Mr. Polk and because of a numerical error contained in Mr. Polk's calculations. Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 29-31. Suffolk County did not disagree with these two criticisms. Correcting these two mistakes, Mr. Lieberman estimated that 96 vehicles would run out of gas using Mr. Polk's methodology. Id. at 31. More importantly, and as Mr. Lieberman also contended, Mr. Polk's estimate had failed to take account of the fuel allocation

plan contained in the LILCO Plan. The Plan specifies that fuel trucks will be stationed at seven locations within or just outside the EPZ; and that each fuel truck will have a capacity of at least 1250 gallons and will dispense three gallons of fuel to each vehicle seeking fuel. Id. Thus, each fuel truck would be able to service at least 400 cars. Id. All seven will be able to service over 2800. Given the length of the average evacuation trip out of the EPZ (on the order of 10 miles), three gallons is more than an ample amount of fuel. Accordingly, this Board finds that regardless of whether we accept Mr. Polk's estimate, or Mr. Lieberman's corrections to that estimate, it seriously overstates the number of cars that will run out of fuel during an evacuation. Particularly given the fuel allocation program, few if any vehicles should run out of gas during an evacuation.

460. LILCO also conducted sensitivity studies on the effect of accidents and breakdowns on evacuation time estimates. In two different model runs, four accidents were assumed to take place simultaneously on different links of the network. The accident locations were selected in a random manner, limited only by the constraint that each accident location must service a high volume of traffic. Cordaro et al. (Contention 65), ff. Tr. 2337, at 84; cf. Herr, ff. Tr. 2909, at 36 (approval of a randomized method for determining the possible effects of accidents and breakdowns). It was further assumed that one of these four accidents would create a blockage for a period of 30 minutes while the other three would create blockages of 15 minutes each. Id.; see also Urbanik, ff. Tr. 3430, at 13. These studies indicate that the effect of accidents on evacuation time estimates are negligible (compare Table 1, Cases 12, 29 and 30). See Cordaro et al. (Contention 65), ff. Tr. 2337, at 85; Urbanik, ff. Tr. 3430, at 13.

461. The LILCO Transition Plan contemplates that roadway shoulders will serve primarily as storage areas for abandoned or disabled vehicles. See Cordaro et al. (Contention 65), ff. Tr. 2337, at 87; Tr. 2635 (Lieberman). The testimony of Suffolk County witnesses Roberts et al. proceeds from the mistaken assumption that roadway shoulders will be used as evacuation roadways, and hence that the "driveability" of those shoulders is important. See Roberts et al. (Contention 65), ff. Tr. 2260, at 68-69. The LILCO Transition Plan simply does not rely on the availability of those shoulders for evacuation traffic.

462. While road construction and repair occur with some regularity in Suffolk County, their location, effects and frequency are only speculative. Tr. 3746-47, 3750 (Beach); Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 27. As NRC Staff witness Urbanik notes, emergency decision makers should factor specific facts relative to construction or repair into their ongoing readiness for emergencies and into their decisions at the time of an accident, since they cannot be readily determined a priori earlier. See Urbanik, ff. Tr. 3430, at 14. LILCO has agreed to do just that, committing to review projected construction activity periodically, and to assess its impact on evacuation planning. Cordaro et al. (Contention 65, Supp. II), ff. Tr. 3857, at 28; see also Tr. 3749-50 (Knighton, Beach).

463. As we conclude below (see Findings 468 to 471), evacuees are unlikely to panic during evacuation. Certainly, people are unlikely to voluntarily abandon their cars in the middle of a road and continue their evacuation on foot. Thus, to the extent Contention 65.D.4 seeks to hypothesize this type of voluntary abandonment, it is without factual basis. Other

potential causes of abandonment, while unlikely, include mechanical breakdowns and cars running out of gas. In these cases, the vehicles will probably be able to coast over to the shoulders of the road or be easily pushed there. In either case, evacuation time estimates would not be affected.

Cordaro et al. (Contention 65), ff. Tr. 2337, at 87.

Congestion Caused by Early Dismissal of School
Children and Evacuation of Special Facilities (65.E)

464. In Contention 65.E., Suffolk County argues that the early dismissal of school children and the evacuation of special facilities and the handicapped will cause additional congestion and further lengthen evacuation times. The early dismissal of schools and the evacuation of people in special facilities and the handicapped were considered in the evacuation time estimates contained in the LILCO Transition Plan. The Plan assumes that school children will normally be dismissed and bused home from school at the Alert stage. Cordaro et al. (Contention 65), ff. Tr. 2337, at 88; see also McIntire, ff. Tr. 2086, at Q.23. School-to-home travel time data are incorporated explicitly in the statistical analysis detailed in Attachment 10 to the LILCO testimony. A review of that attachment indicates that the return of school children, even during the period when buses are not readily available at the schools, does not measurably affect trip generation distributions. See Cordaro et al. (Contention 65), ff. Tr. 2337, at 91, Att. 10; Urbanik, ff. Tr. 3430, at 14.

465. The total number of vehicles involved in the evacuation of special facilities and of the handicapped will be less than 1 percent of the total of evacuating vehicles. Accordingly, there is no basis to conclude that any increase in evacuation times will result from their presence. Cordaro et al. (Contention 65), ff. Tr. 2337, at 91; Urbanik, ff. Tr. 3430, at 14.

Affect of Stress on Drivers (65.F)

466. In Contention 65.F, Suffolk County alleges that (1) stress and anxiety will diminish driving skills during an emergency, resulting in poor driver behavior that will increase evacuation time estimates and (2) the geography of Long Island "may create a feeling of being 'closed in' which may increase the likelihood of poor driver behavior." For the reasons stated below, we find that driver stress and anxiety or "feelings of being 'closed in'," even if they occur, will not affect evacuation time estimates.

467. The LILCO and County witnesses agree that stress and anxiety in a human population experiencing an emergency will indeed increase. Cordaro et al., ff. Tr. 1470, at 130; Saegert, ff. Tr. 2259, at 3. The behavioral consequences of increased stress and anxiety levels are not necessarily negative, however. While one could hypothesize that increased stress and anxiety will impair judgment, an equally plausible hypothesis is that added stress and anxiety levels increase vigilance and result in better driving skills. Cordaro et al., ff. Tr. 1470, at 130-31; Tr. 2502-03 (Lieberman). For example, while stress levels in the population surrounding TMI increased due to the accident, id., there was no evidence that automobile accidents increased during the evacuation at TMI, despite increased traffic volume on highways. Id. at 131-32. In addition, it has been noted in many studies of other emergencies that accidents and traffic jams are not problems in vehicular evacuations. Id. at 132; Urbanik ff. Tr. 3430, at 13; Tr. 3450-51 (Urbanik).

468. Being "closed in" affects driving behavior negatively only if it is part of a complex of factors that lead people to panic. Emergencies have

occurred in locations where geographical features have actually isolated a portion of the population from evacuation routes or from safe locations, but people have not panicked, even when they have been "closed in." Cordaro et al., ff. Tr. 1470, at 133-34; see McIntire ff. Tr. 2086, at 7. The determinants of panic would be absent in any emergency at Shoreham, and therefore it is extremely unlikely that the result of a person feeling "closed in" on Long Island (assuming anyone did) would be poor driving behavior. Cordaro et al., ff. Tr. 1470, at 134.

469. We therefore find that driving skills and driver awareness would not decrease in a radiological emergency, and it is not the case that the state of driving skills and driver awareness would cause confusion, congestion, and traffic accidents, should an evacuation be ordered at Shoreham. Cordaro et al., ff. Tr. 1470, at 134-35; Urbanik, ff. Tr. 3430, at 13. Even if one assumes that decreased driving skills would cause traffic accidents during an evacuation around Shoreham, evacuating traffic will be moving at a rate so slow that accidents would be of a minor nature, Cordaro et al., ff. Tr. 1470, at 135, and therefore would not affect traffic time estimates.

Inclusion of Time Estimates for Special
Population Groups (65.G)

470. Contrary to the unsupported assertion in Contention 65.G., the LILCO Transition Plan contains evacuation time estimates for people without access to cars (Appendix A, pp. IV-74b) and people in special facilities and the handicapped (Appendix A, p. V-8). See Cordaro et al. (Contention 65), ff. Tr. 2337, at 93-94; Urbanik, ff. Tr. 3430, at 15-16. School children are normally assumed to evacuate as members of the family unit. Cordaro et al. (Contention 65), ff. Tr. 2337, at 93. Therefore, their evacuation time will be

the same as either the automobile-owning public or the public without access to cars. Id. Suffolk County never questioned these assertions, nor presented any testimony on this contention.

Evacuation Route Spotters (65.H)

471. In Contention 65.H., Suffolk County argues that the evacuation route spotters designated in the LILCO Transition Plan will be ineffective. The responsibility of the evacuation route spotters involves, "[t]raveling through the areas being evacuated to verify and report on evacuation traffic flow as directed by the Evacuation Route Coordinator." Cordaro et al. (Contention 65), ff. Tr. 2337, at 94. The LILCO Transition Plan states that six route spotters will patrol the important evacuation routes listed in Figure 8.1 of Appendix A. In addition, unless weather prohibits, LERO will also utilize helicopters for aerial surveillance of evacuation routes. Id. at 94-95; Tr. 2588-89 (Weismantle). Given the small number of accidents expected during an evacuation and their minimal effects on evacuation time estimates, the provisions for route spotters contained in the LILCO Transition Plan comply with the requirements of NUREG-0654.

Systematic Evacuation of EPZ (23.C)

472. Contention 23.C. suggests that a systematic, area-by-area evacuation of the EPZ is unrealistic because people will voluntarily evacuate other zones within the EPZ even though not ordered to do so. Under the LILCO Transition Plan, the actual zones to be evacuated, should such an emergency action be necessary, will be chosen using "keyhole" configurations. The keyhole size and orientation will be chosen using computer dose projections. The zones to be evacuated will then be selected based on their

correspondence with the chosen keyhole. If any part of a zone falls within the keyhole configuration, then the entire population within the zone will be ordered to evacuate. Cordaro et al. (Contentions 23.C, D, and H), ff. Tr. 2337, at 9.

473. The LILCO Plan does not contemplate a "systematic area-by-area" or "staged" evacuation as Contention 23.C suggests, Cordaro et al. (Contentions 23.C, D, and H), ff. Tr. 2337, at 10, although, as Dr. Urbanik notes, a staged evacuation would also be in keeping with the sector concept of NUREG-0654, Urbanik, ff. Tr. 3430, at 9-10. All zones for which evacuation is recommended will be evacuated simultaneously. The only time that the LILCO Plan contemplates that a protective action recommendation will be modified is when factual changes have occurred that suggest substantial changes in affected areas, or in the nature or timing of the effect from a release. Cordaro et al. (Contentions 23.C, D, and H), ff. Tr. 2337, at 10.

Evacuation Time Estimates Assuming Voluntary
Evacuation Outside the Shoreham EPZ (23.D)

474. In Contention 23.D, Suffolk County alleges that voluntary evacuees from outside the EPZ -- the so-called "shadow phenomenon" -- will impede traffic evacuating the EPZ, thus increasing the evacuation times presented in Appendix A of the LILCO Plan. In response to this concern, LILCO performed a series of model runs to examine the impact of hypothetical voluntary evacuation from areas outside the EPZ on the ability of traffic originating within the EPZ to leave the 10-mile EPZ. Cordaro et al. (Contentions 23.C, D, and H), ff. Tr. 2337, at 13, Att. 11. The effects of a shadow phenomenon were studied for both a "controlled" and an "uncontrolled" evacuation. Id. Suffolk County also presented analyses designed to study the impact of

the shadow phenomenon. Polk, ff. Tr. 2909, at 5, Att. 3. For the reasons detailed below, this Board concludes that these analyses reach virtually identical conclusions once their assumptions are held consistent: namely, that for "uncontrolled" evacuations, a 50% voluntary evacuation of persons living outside the EPZ would increase evacuation time estimates for evacuees from within the EPZ by only about one hour. Thus, even if such a large voluntary evacuation were to occur, which this Board has already concluded will not (see Finding 34 above), our conclusion about the accuracy of the evacuation time estimates in the LILCO Plan would not change.

475. LILCO studied the shadow phenomenon under five scenarios, all of which assumed an evacuation of the entire EPZ. For a controlled evacuation, two runs were made, one assuming 25% and the other 50% voluntary evacuation under normal weather conditions. For an uncontrolled evacuation, three runs were made, one each assuming 25% and 50% voluntary evacuations under normal weather conditions and one assuming 50% voluntary evacuation under inclement, winter weather conditions. Cordaro et al. (Contentions 23.C, D, and H), ff. Tr. 2337, at 14.

476. For these runs, KLD assumed that voluntary evacuees in areas outside the EPZ would begin their evacuation trips over a period of 4 hours, compared to a trip generation period of 2 hours for people living within the EPZ. Cordaro et al. (Contentions 23.C, D, and H), ff. Tr. 2337, at 16-17. This difference in trip generation period was based on a number of factors including (1) longer notification times for areas outside the EPZ because of limited siren coverage, (2) no special dismissal program for school children in these areas, and (3) a likely perception by people in these areas that the

incentive to evacuate rapidly is not as compelling as in those areas closer to the plant. Id. Suffolk County witnesses Herr and Pigozzi argued that this two-hour difference in trip generation period was unacceptable. See Herr, ff. Tr. 2909, at 53; Pigozzi, ff. Tr. 2909, at 47. Each based his conclusion solely on his instinctive perception that notification time would not be delayed in areas outside the 10-mile EPZ. Id. Given the lower level of urgency likely to be perceived by persons living outside the EPZ, KLD's trip generation assumption has a sound, rational basis. In addition, if substantial voluntary evacuation occurred outside the EPZ, then congested conditions would develop rapidly on roads outside the EPZ, Tr. 2742 (Lieberman), thus making these mobilization arguments academic. See Finding 439 above.

477. The results of LILCO's studies show that for a "controlled" evacuation of the entire 10-mile EPZ and a voluntary evacuation of 25% of the population living from 10 to 20 miles from the plant, the total evacuation time for people within the 10-mile EPZ would lengthen by 20 minutes. Table 1, Cases 12 and 22. For a 50% voluntary evacuation, the time would increase by 1 hour 40 minutes. Table 1, Cases 12 and 23. For an "uncontrolled" evacuation of the entire 10-mile EPZ, 25% and 50% voluntary evacuations of people from the 10 to 20 mile region would increase total evacuation time for people within the EPZ by 30 minutes and 1 hour 5 minutes, respectively. Table 1, Cases 24, 26 and 27; Cordaro et al. (Contention 65), ff. Tr. 2337, at 17-18, Att. 15.

478. Suffolk County also presented evacuation time estimates for the Shoreham EPZ if a shadow phenomenon were assumed. Polk, ff. Tr. 2909, at 5-10. The results of these analyses show evacuation times of about 17 hours in summer and about 11 hours in winter.^{91/} Polk, ff. Tr. 2909, at 5,, Att.

^{91/} Mr. Herr endorsed these evacuation time estimates. Tr. 3039 (Herr). The Board has serious doubts about the accuracy of the evacuation time esti-

3. A review of these results and of LILCO's analyses of them has convinced this Board that these values do not provide an accurate representation of evacuation times for people living within the EPZ. The fundamental flaw of these analyses is that these estimates are not for people living within the EPZ -- the area for which emergency planning is required. Instead, they reflect the evacuation time for over half of the residents of the eastern forks of Long Island -- some of whom live as much as 50 miles from the Shoreham plant and virtually all of whom take evacuation paths that never enter the EPZ. See Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337 at 5, 12-13. Thus, on their face, Suffolk County's evacuation time estimates must be rejected as yet another attempt to extend the emergency planning zone well beyond 10 miles.^{92/}

479. LILCO performed a detailed analysis of the computer printouts from Mr. Polk's analyses. This work, which was not disputed by Suffolk County either in prefiled testimony or cross-examination, shows that had Mr. Polk based his evacuation time estimate on the time needed for all persons

(footnote continued)

mates presented by Mr. Polk. The analyses performed by Mr. Polk were based on four unconnected, east-west evacuation routes. Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 11. Traffic was not permitted to flow from one evacuation route to another to equilibrate roadway usage. Id. In addition, the analyses were performed on the basis of a single, presumed assignment of evacuees to evacuation routes. Id. at 12. As a result, roadway capacities were, in some case, unrealistically underutilized; routing assignments were arbitrary; and unnecessarily extreme bottlenecks were permitted to occur. Id.

^{92/} Suffolk County's Contention 22 and its subparts A, B, and C, which dealt with an expansion of the EPZ boundary, were denied admittance by this Board's Special Prehearing Conference Order (Ruling on Contentions), dated August 19, 1983.

originating within the EPZ to cross the boundaries of the EPZ, then he would have produced an evacuation time estimate virtually identical to the LILCO estimates. Cordaro et al. (Contention 65, Supp. I), ff. Tr. 2337, at 19-24. Mr. Polk agreed with LILCO's conclusion in response to questioning by the Board. Tr. 3378 (Polk).

Access Control to EPZ (23.H)

480. Contention 23.H contends that the LILCO Transition Plan fails to provide adequate control of access at the EPZ perimeter, thus violating the requirements of NUREG-0654, Section II.J.10.j. At the outset, this Board notes that the apparent intent of Suffolk County's contention was to raise concerns about perimeter control during an evacuation of the Shoreham EPZ. This concern is not addressed by NUREG-0654 II.J.10.j, which involves control of access to evacuated areas.

481. The LILCO Transition Plan assigns personnel at all major entrances to the EPZ to guide traffic entering and leaving the EPZ at those locations. Cordaro et al. (Contention 65), ff. Tr. 2337, at 21. These traffic guides will deploy traffic cones in a manner that will indicate to the public that entry into the EPZ at these points is discouraged, but they will not attempt to screen or deter any vehicles seeking to enter the EPZ, or prohibit their entry in any way. Id. Their primary function will be to facilitate the evacuation of vehicles from inside the EPZ. Id. These perimeter control techniques were found acceptable by FEMA witness McIntire. McIntire, ff. Tr. 2086, at 3. The Board concludes that these perimeter control techniques are adequate.

B. Road Obstacles and Cars Without Fuel (66)

482. Contention 66, which was sponsored by Suffolk County, and Contention 97, which was sponsored by the Shoreham Opponents Coalition, raise a series of issues related to the logistics of carrying out an evacuation of the Shoreham EPZ.^{93/} These issues include whether the LILCO Transition Plan provides for (1) an adequate number of tow trucks to remove disabled vehicles in an expeditious manner, (2) the transportation of persons whose cars become disabled, (3) snow removal, and, (4) an adequate fuel distribution system.

483. Direct cases on these contentions were presented by LILCO, FEMA, Suffolk County, and New York State,^{94/} which were cross-examined for 3 hearing days: LILCO, April 25 and 26, 1984, Tr. 6686-865, 6951-7003;

^{93/} Subpart E of Contention 66 was withdrawn by Suffolk County following publication of Revision 3 to the LILCO Transition Plan (Suffolk County Proposed Emergency Planning Contentions, January 12, 1984). Subpart A of Contention 97 was denied admission by this Board's Special Prehearing Conference Order (Ruling on Contentions), dated August 19, 1983.

^{94/} LILCO's prefiled testimony on Contention 66 (hereinafter, Cordaro et al. (Contention 66), ff. Tr. 6685) was sponsored by Dr. Matthew C. Cordaro, Mr. John A. Weismantle, and Mr. Edward B. Lieberman; these witnesses testified as a panel. LILCO's testimony on Contention 97 (hereinafter, Cordaro et al. (Contention 97), ff. Tr. 6950) was sponsored and testified to by Dr. Cordaro, Mr. Weismantle, and Mr. Michael L. Miele. FEMA's testimony was sponsored by Mr. Thomas E. Baldwin, Mr. Joseph H. Keller, Mr. Roger B. Kowieski, and Mr. Philip H. McIntire (hereinafter, Baldwin et al., ff. Tr. 12,174); these witnesses testified as a panel. Suffolk County's testimony, which addressed only Contention 66 (hereinafter, Monteith et al. (Contention 66), ff. Tr. 6868), was sponsored by Assistant Chief Inspector Joseph L. Monteith, Deputy Chief Inspector Richard C. Roberts, Deputy Inspector Philip McGuire, Deputy Inspector Michael J. Turano, Jr., and Captain Edwin J. Michel and was testified to by a panel consisting of Messrs. Monteith, McGuire, Turano, and Michel. New York State's testimony, covering Contentions 66.D and 97.B (hereinafter, Gibbons, ff. Tr. 7005), was sponsored and testified to by Mr. Thomas D. Gibbons.

FEMA, July 12, 1984, Tr. 12,801-22; Suffolk County, April 25 and 26, 1984, Tr. 6869-945; New York State, April 26, 1984, Tr. 7006-37.

Number of Road Crews Assigned to Remove
Obstructions from Roadways (66.A)

484. The LILCO Transition Plan specifies that a maximum of twelve road crews will be assigned to remove roadway obstructions during an evacuation. The number of road crews that will actually be assigned will depend on the size of the area to be evacuated. Cordaro et al. (Contention 66), ff. Tr. 6685, at 6.

485. These road crews will be assigned LILCO-owned vehicles for removing obstacles from roadways. In selecting the actual vehicles to be used during an evacuation, the physical characteristics of the vehicles and their proximity to the EPZ will be considered. Cordaro et al. (Contention 66), ff. Tr. 6685, at 6-7. Tow trucks will be the principal vehicles used in removing obstructions; alternate vehicles will be chosen from a hierarchical listing. Id.; Tr. 6709-12 (Weismantle).

486. LILCO testified that the twelve road crews specified in the Plan were selected on the basis of two considerations: first, the number of obstructions likely to need clearing; and second, the time needed to clear a given obstruction. Cordaro et al. (Contention 66), ff. Tr. 6685, at 7. Based on national accident statistics, LILCO estimated that four accidents/breakdowns would occur during an evacuation of the Shoreham EPZ. Id. at 8; see Findings 458-600 above. LILCO further testified that not all of these accidents/breakdowns would result in a disabled vehicle and hence the need for road crew response. Cordaro et al. (Contention 66), ff. Tr. 6685, at 7-9. Finally, LILCO testified that rapid response times would be realized

because road crews will be assigned to intersections of major east-west and north-south evacuation routes. Id. at 9.

487. FEMA witnesses stated that the provisions in the Plan for removal of disabled vehicles were adequate. Baldwin et al., ff. Tr. 12,174, at 63; Tr. 12,802 (Baldwin). On cross-examination, FEMA witnesses explained that their conclusion about the adequacy of the Plan's tow truck provisions was a general one, premised on the existence of such provisions in the Plan rather than on a judgment about the adequacy of the specific number of tow trucks specified in the Plan. Tr. 12,803 (Baldwin). They also noted that NUREG-0654 provides no specific guidelines for judging whether a specific number of tow trucks is adequate. Id.; Tr. 12,815 (Kowieski).

488. Suffolk County witnesses stated that twelve road crews were not sufficient, because of the area that needed to be covered and the number of accidents likely in their view to occur. Monteith et al. (Contention 66), ff. Tr. 6868, at 5, 7. However, when questioned, the Suffolk County witnesses were unable to identify the number of road crews that would be sufficient. Tr. 6931 (Monteith).

489. Given this Board's earlier conclusions about the number of accidents likely to occur during an evacuation (see Findings 458-60), this Board concludes that the twelve road crews specified in the LILCO Transition Plan will be more than adequate to remove any disabled vehicles from the roadways.

Time Needed to Remove Obstacles (66.B)

490. The speed at which a road crew will be able to remove an obstruction from a roadway depends both on the proximity of the road crew to the obstruction and the congestion it will encounter in reaching that obstruction. Cordaro et al. (Contention 66), ff. Tr. 6685, at 10. The LILCO witnesses testified that steps had been taken to minimize each of these factors. Road crews have been located on evacuation routes with the largest traffic flow at spacing intervals of two to four miles. Id.; Tr. 6734-35 (Lieberman). In addition, the crews have been placed predominantly to the south and west of the plant at radial distances of five to ten miles. Cordaro et al. (Contention 66), ff. Tr. 6685, at 10. Thus, the greatest probability is that these road crews will travel in a counter flow direction to evacuating traffic in reaching an obstruction. Tr. 6726 (Lieberman).

491. Suffolk County attempted to establish in direct testimony and by cross-examination that road crews would, in many instances, be required to travel concurrently with evacuating traffic. See Monteith et al. (Contention 66), ff. Tr. 6868, at 12; Tr. 6780-83 (Lieberman, Weismantle). While it is possible to imagine cases where a road crew would need to travel with evacuating traffic in reaching an obstruction, in the vast majority of cases the proposed placement of the twelve road crews would allow those crews to travel countercurrent to evacuating traffic. Thus, given the relatively short distances that the crews will need to travel to reach an obstruction, the response of those crews will be suitably expeditious.

Evacuation of Persons Whose Cars
Become Disabled (66.C)

492. The LILCO Transition Plan does not explicitly provide for the evacuation of persons whose cars become inoperable because of breakdowns or accidents. Cordaro et al. (Contention 66), ff. Tr. 6685, at 11; Tr. 6794 (Weismantle). However, such express treatment is not required. People whose automobiles become disabled will undoubtedly be offered rides by fellow evacuees. Cordaro et al. (Contention 66), ff. Tr. 6685, at 12. In addition, these people could catch a ride on one of the numerous buses transporting people from the EPZ, or could ride with the road crew. Id. at 11.

Snow Removal (66.D)

493. All parties agreed that LERO had no agreements with local organizations for snow removal services. Tr. 6801 (Weismantle); Cordaro et al. (Contention 66), ff. Tr. 6685, at 13; Monteith et al. (Contention 66), ff. Tr. 6868, at 15; Gibbons, ff. Tr. 7005, at 3; Baldwin et al., ff. Tr. 12,174, at 65. However, LILCO argued that no such agreements were needed since local governments have a continuing responsibility to perform their normal responsibilities. Cordaro et al. (Contention 66), ff. Tr. 6685, at 13; Tr. 6804 (Weismantle), 6805 (Cordaro). For example, if an Unusual Event or Alert classification was in effect and there was no immediate hazard to the snow removal crews, it would remain the appropriate government's responsibility to remove the snow. Tr. 6805 (Cordaro); see also Tr. 7012-13, 7036-37 (Gibbons).

494. In addition, LILCO argued that there would be little or no effect on the LILCO Plan even if snow removal crews did not perform their normal functions during an emergency at Shoreham. Cordaro et al. (Contention 66),

ff. Tr. 6685, at 13. LILCO postulated two all-inclusive scenarios for adverse weather conditions that could exist when the siren system was sounded and snow removal crews were assumed to abandon their jobs. Id. In the first, if light to moderate snow were falling, an evacuation order would be premised on the adverse winter weather evacuation time estimates contained in OPIP 3.6.1, and further accumulation of snow following the cessation of plowing would not affect the assumptions made in computing those evacuation time estimates. Id. In the second, if a heavy snowfall or blizzard condition were assumed, then roads, and particularly side streets and driveways, would be literally or nearly impassable. As a result, the protective action recommendation would be based on a default evacuation time of 24 hours, which would produce a shelter recommendation. Id. at 14. Continued plowing of major roadways within the EPZ would not change that recommendation. Id.; cf. Tr. 6899 (Turano, Monteith) (impassability of roads along north shore). Further, all parties were in agreement that should an evacuation be ordered, continued plowing would be counter-productive since snow removal equipment was likely to impede, rather than aid, traffic flow. Tr. 6815 (Lieberman), 6898 (Monteith), 7008-09 (Gibbons).

495. Thus, Suffolk County's concern about the absence of snow removal agreements is illusory. Snow removal operations would continue as normal until at least the time an emergency were to be declared at the Shoreham site. At that time, even if snow removal operations were assumed to cease, protective action recommendations would be unlikely to change from "evacuate" to "shelter" and hence, dose minimization would still be realized. See Cordaro et al. (Contention 66), ff. Tr. 6685, at 13-14.

Fuel Disbursement (66.F)

496. The LILCO Transition Plan provides for fuel to be dispensed to vehicles at seven sites within or near the Shoreham EPZ. These fuel allocation sites will be located along the major east-west and north-south evacuation routes. Cordaro et al. (Contention 66), ff. Tr. 6685, at 14-15. Located at each site will be a fuel truck having a capacity of at least 1200 gallons or, assuming a limit of three gallons per evacuating vehicle, the ability to service 400 vehicles. Id. at 15.

497. While exact locations (as distinguished from general areas) have not been chosen for these fuel allocation sites, Tr. 6837, 6842-43 (Lieberman), the considerations that LILCO will use in selecting these locations^{95/} combined with the realization that NUREG-0654 does not even include provisions for fuel distribution, see Tr. 12,818 (Keller), leads this Board to conclude that LILCO's fuel allocation plan is acceptable.

C. Weather (97)

498. The LILCO Transition Plan designates a range of protective actions based on EPA's Protective Action Guides. Cordaro et al. (Contention 97), ff. Tr. 6950, at 7. These protective actions apply to all circumstances, including adverse winter weather. Id. at 8.

499. The Shoreham Opponents Coalition's concerns about the functioning of the LILCO Transition Plan should a deep snowfall occur are without basis. As LILCO testified without serious contradiction, severe snowfalls are

^{95/} These considerations include placing allocation sites in areas adjoining evacuation roadways, providing sufficient space to hold multiple vehicles, and clearly indicating a limit of three gallons per car. Cordaro et al. (Contention 66), ff. Tr. 6685, at 14-16; Tr. 6838 (Lieberman).

relatively rare on Long Island compared to conditions at other nuclear power plants. Id. at 8; see also Tr. 6963 (Cordaro), 6993 (Miele); cf. Tr. 7032 (Gibbons) (in the last eight years, snowfalls of four or more inches have occurred, on average, four days a year). In addition, weather conditions are considered in making a protective action recommendation; if roads and drive-ways are impassable, then sheltering would minimize doses to the general public and would be recommended. Cordaro et al. (Contention 97), ff. Tr. 6950, at 8. This recommendation can be made by the Director of Local Response either from his home or office without the EOC being manned. Id. at 10.

D. Buses for the Public (67, 24.I and 24.F.2)

500. In Contention 67, Suffolk County raises a variety of issues about the bus transportation system that has been provided in the LILCO Transition Plan or the evacuation of EPZ residents who do not have access to automobiles.^{96/} These issues include the number of potential evacuees who will require bus transportation, the number of buses and bus trips needed to serve that group, the time needed to complete bus routes, and the adequacy of the sheltering provisions at the eleven transfer points. Suffolk County Contentions 24.I and 24.F.2 raise questions about the sufficiency of the letters of agreement LILCO has for use of the designated transfer points and buses. For the reasons detailed below, the Board finds that the bus transportation system provided in the LILCO Transition Plan is adequate, and that the

^{96/} Subpart B of Contention 67 was withdrawn by Suffolk County following the publication of Revision 3 to the LILCO Transition Plan (Suffolk County Proposed Emergency Planning Contentions, dated January 12, 1984).

letters of agreement LILCO has for use of transfer points and buses satisfy NUREG-0654.

Evacuation Time Estimates for
the Transit-Dependent Population (67)

501. Direct cases on Contention 67 were presented by LILCO, FEMA, Suffolk County, and New York State, which were cross-examined for five hearing days: LILCO, May 3, 4, and 8, 1984, Tr. 7981-8139, 8362-83, 8440-71; FEMA, July 12 and 13, 1984, Tr. 12,820-21, 12,859-99; Suffolk County, May 4 and 8, 1984, Tr. 8151-262, 8481-533; and New York State, May 4, 1984, Tr. 8290-354.

502. Prior to dealing with the specific subparts of Contentions 67, it is helpful to review briefly the details of the bus transit plan presented in Appendix A to the LILCO Transition Plan. The transit plan is based on the establishment of 11 transfer points, which act as depots. Cordaro et al. (Contention 67), ff. Tr. 7980, at 12. At each transfer point there will be two categories of buses: route buses and transfer buses. Id. Route buses will depart from transfer points, travel along their assigned routes picking up passengers, and then return with them to the transfer points. Id. at 12-13. Route buses are scheduled to make one or more runs along their assigned routes, depending on the length of the route, returning each time to the transfer point. Id. at 15. Transfer buses make only one trip, from the transfer point to an assigned relocation center,^{97/} carrying passengers who have been transferred from route buses. Id. at 13. Upon their arrival at

^{97/} While the LILCO Plan no longer uses multiple relocation centers, transfer buses would still make a single trip from a transfer point to reception center/congregate care center.

transfer points, route bus passengers will either transfer from the route buses to waiting transfer buses or will remain on route buses -- which will then be, by definition, transfer buses -- and will proceed directly to the assigned relocation center. Id. It is not contemplated that transfer buses will return to the transfer points following their arrival at relocation centers. Id.

Adequacy of Bus Trips Specified in
the LILCO Transition Plan (67.A)

503. Contention 67.A asserts that the 333 buses provided in the LILCO Transition Plan for the evacuation of that portion of the EPZ population presumed to be without access to automobiles are insufficient to accomplish this purpose, because LILCO has underestimated the transit-dependent population and has assumed too high a bus capacity factor. The Board finds these claims meritless, and in addition finds meritless the unrealistically conservative assumption that autoless EPZ residents would not, under any circumstances, obtain rides from neighbors or friends. See Cordaro et al. (Contention 67), ff. Tr. 7980, at 12; cf. Tr. 12,870-71 (McIntire) (successful evacuations have been carried out with no plans for buses). Accordingly, the Board concludes that the bus transportation plan provides an ample number of buses to serve the transit-dependent population in the Shoreham EPZ. Indeed, the Board finds that there is such overwhelming conservatism in the LILCO transit plan that some buses currently committed to evacuating the transit-dependent population could be used to assist in other aspects of an evacuation.

504. The transit plan presented in Appendix A is based on an estimated passenger demand of 11,097, which was a value initially calculated by members of the Suffolk County Planning Department. Cordaro et al.

(Contention 67), ff. Tr. 7980, at 11. LILCO witnesses explained that they were unsure of the bases for this demand estimate since Suffolk County had severed communications between members of its Planning Department and LILCO. Id. LILCO witnesses testified that an independent assessment of the transit-dependent population, produced using the NCTR survey results and the unreasonably conservative assumption that no transit-dependent individuals would obtain rides from neighbors or friends, yielded an estimated passenger demand of 6,500. Id. LILCO nevertheless used the Suffolk County Planning Department estimate as its planning basis out of an abundance of caution. Id. at 11, 12.

505. Suffolk County witness Herr essentially argued that Suffolk County's own earlier estimates were wrong. Mr. Herr estimated that anywhere from 13,000 to almost 22,000 potential evacuees would require bus transportation. See Herr and Michel, ff. Tr. 8150, at 9; Tr. 8485-504 (Herr); S.C. Ex. 42. Mr. Herr's estimates were based on a combination of data and extrapolations from the 1980 census data, from LILCO's estimate of the number of transit-dependent individuals, and from his own intuitive judgment. See Herr and Michel, ff. Tr. 8150, at 10-20.

506. New York State witnesses did not address the number of potential evacuees needing bus transportation.

507. A closer review of Mr. Lieberman's and Mr. Herr's calculations reveals that there are only limited differences between them. Mr. Herr's assertion that 1980 census data are significantly different than the NCTR survey results, see Tr. 8223 (Herr), are without basis. Calculations by Mr. Lieberman show that if consistent sets of NCTR data and 1980 census data are

used to calculate the transit-dependent population then similar transit-dependent populations are predicted.^{98/} The primary difference between the two calculations centers on the assumptions made about the number of commuters who will return home to reunite with their families. See Tr. 8487 (Herr). Mr. Lieberman estimated that 7% of commuters might not return home if an emergency were declared.^{99/} Tr. 8037-41 (Lieberman). Mr. Lieberman based this conclusion on a review of available empirical data describing the variance of traffic volume during normal peak hour conditions, reasoning that such variations might indicate exceptional activities that would suggest that a commuter might not return home. Id. Mr. Herr argued that from 12 to 19% of all commuters would not return to the EPZ to reunite with their families. Herr and Michel, ff. Tr. 8150, at 16, Table 6; Tr. 8495 (Herr); S.C. Ex. 42. Mr. Herr based his conclusion on commuting time data from the 1980 census and on his intuitive judgment about how commuters, having the only means of available transportation for their family, would perceive the merits of returning to the EPZ to pick up their family. See Tr. 8242 (Herr).

508. Mr. Herr's hypothesis is simply contrary to other evidence in this proceeding. First, it has been generally agreed that families will reunite before evacuating.^{100/} By contrast, Mr. Herr's reasoning requires the

^{98/} Tr. 8367-77 (Lieberman); LILCO Ex. 36. Mr. Lieberman estimated that there would be 6,500 transit-dependent persons using the NCTR results, and 6,993 using the 1980 census data. Id. Mr. Lieberman's calculations based on the 1980 census data also used more recent LILCO population data. Id.

^{99/} This 7% figure produced a transit-dependent demand estimate of 6,500, which is well below the demand of 11,097 used as the basis for the LILCO transit plan. See Cordaro et al. (Contention 67), ff. Tr. 7980, at 7-11.

^{100/} Testimony by Suffolk County witness Erikson on role conflict was based almost entirely on the strength of his conviction that people will try to

assumption that a minimum of one in eight, and as many as one in five, households would not reunite due to a worker not returning home; such a finding is unsupported by the record. Second, Mr. Herr's hypothesis is inconsistent with his testimony on Contentions 65 and 27, where he asserted that evacuation of the automobile-owning public and mobilization of LERO workers would be significantly delayed because of congestion created by the work-to-home trips of commuters. Herr, ff. Tr. 2909, at 18. Mr. Herr would now assume that up to 20% of those trips would not occur;^{101/} thus their capacity to induce delays in evacuation and mobilization would be correspondingly reduced. Thus, the Board accepts Mr. Lieberman's estimate as reasonable and rejects Mr. Herr's as internally inconsistent and contrary to the record.

509. New York State witnesses argued that the number of buses needed to transport any given number of persons from the EPZ was significantly higher than that calculated by LILCO. Their argument was premised on two grounds: first, that buses should be limited to a single run, and second, that LILCO should have used a bus carrying capacity of 22.5 passengers rather than the 30 passengers assumed by LILCO. Acquario *et al.*, ff. Tr. 8289, at 7-9. New York State witnesses suggested that limiting route buses

(footnote continued)

join their families before evacuating. Erikson and Johnson, ff. Tr. 1455, at 13.

^{101/} If accepted, Mr. Herr's assumption would also contradict his earlier testimony that there would be large numbers of pre-evacuation trips. Herr, ff. Tr. 2909, at 18. Pre-evacuation trips would be reduced proportionately to the percentage of commuters who did not return to reunite with their families, since those families would, by definition, be without access to a car.

to a single run would have two effects: it would improve the flexibility of the transit plan, and would also lower the risk of driver exposure to radiation. Id. at 7-8. Neither of these reasons is convincing. As LILCO witnesses testified, the schedules contained in Appendix A are not rigid; buses can make additional runs if people remain on given routes, or buses can be reassigned to other routes by the transfer point coordinator to meet demand/supply imbalances. See Tr. 8082-84 (Lieberman, Weismantle). Thus, LILCO's transit plan already possesses significant flexibility, which would not be measurably improved by New York State's suggestion. New York State's concern about driver exposure is without basis. All drivers will be given dosimetry which they will be instructed to check regularly and to take appropriate action if necessary. See Tr. 8297 (Albertin); OPIP 3.6.4, § 5.7.2 and Att. 2.

510. The dispute over the carrying capacity of buses requires the resolution of two questions: first, the physical capacity of the buses, and second, the relationship between the physical capacity of buses and the spatial and temporal distribution of passenger demand. LILCO's analyses, in keeping with bus transit plans developed for the Indian Point site, assumed that the physical capacity of a bus was 40 adults plus luggage. Cordaro et al. (Contention 67), ff. Tr. 7980, at 8; Tr. 8079-80 (Lieberman, Weismantle). New York State witnesses argued that the maximum adult capacity should be limited to 30 passengers because of the luggage evacuees will seek to carry. Acquario et al., ff. Tr. 8289, at 8.^{102/} As LILCO witnesses explained,

^{102/} All three New York State witnesses testified that they had either never reviewed or had no recollection of bus capacities assumed in other New York State plans. Tr. 8303-06 (Knighton, Acquario, Albertin).

luggage can be stored under seats, in the aisle or on people's laps. Tr. 8079-80 (Lieberman, Weismantle). In addition, bus passengers will be composed of a mixture of adults and children, which makes a nominal capacity of 40 persons based solely on adults conservative. Finally, it must be recognized that during an evacuation a number of bus passengers are likely to be willing to stand. Tr. 12,868 (Keller); see also Cordaro et al. (Contention 67), ff. Tr. 7980, at 14. In this case, the nominal seating capacity may understate the actual effective capacity. Thus, the Board concludes that the 40 passenger capacity assumed by LILCO is reasonable.

511. Since the Board has accepted a bus capacity of 40 adults, the dispute over how the relationship between physical capacity and the spatial and temporal aspects of expected demand affects bus carrying capacity has been mooted.^{103/} In calculating the number of route buses, LILCO assumed that each bus would carry 30 passengers -- a load factor of 75% based on adults only -- in order to account for uncertainties in the spatial distribution of the EPZ population needing bus service. Cordaro et al. (Contention 67), ff. Tr. 7980, at 14. New York State witnesses and Suffolk County witnesses also suggested that a 75% load factor be used in calculating the appropriate number of route buses. See Acquario et al., ff. Tr. 8289, at 8-9; Herr and Michel, ff. Tr. 8150, at 11-12. Thus, the parties are in agreement on the

^{103/} Even if we had concluded that a physical capacity of 30 persons was appropriate, it does not follow that we would have agreed with a bus carrying capacity of 22.5 passengers. As Mr. Lieberman noted, New York State witnesses improperly multiplied two reduction factors to produce a bus carrying capacity of 22.5 passengers. Tr. 8365-66 (Lieberman). The spatial and temporal distribution of passenger demand is unrelated to the physical capacity of a bus -- in other words, evacuees will arrive on street corners at specific times regardless of the size of the pickup bus.

acceptability of the 30 passenger per bus value used by LILCO to calculate the number of route buses.

Evacuation Time Estimates for Buses (67.C)

512. Suffolk County Contention 67.C contends that bus evacuation times will be far longer than those presented in the LILCO Transition Plan. Specifically, Suffolk County argues that LERO will have problems mobilizing buses and bus drivers, that route times will not be met because of heavy congestion, and that the last transfer buses will not be able to clear the EPZ within 15 minutes as stated in the Plan. Herr and Michel, ff. Tr. 8150, at 23-24. Suffolk County's concerns are little more than restatements of issues that we have already decided adversely to Suffolk County in Contention 27 and 65.

513. With regard to the mobilization of buses and bus drivers, we have already concluded that LERO can be mobilized in a timely manner. See Section IV.B above. Testimony by Mr. Lieberman on Contention 67 revealed that LILCO has performed detailed analyses of three extreme accident scenarios to determine how mobilization efforts would impact on the bus schedules contained in Appendix A.^{104/} Tr. 8133-36 (Lieberman). With the exception of the extreme case of an immediate general emergency with an evacuation of the entire EPZ during a school day, Mr. Lieberman testified that the bus schedules in Appendix A could generally be met and that the last portion of

^{104/} The three accident scenarios were: an immediate general emergency with an evacuation of the entire 10-mile EPZ during a school day; an immediate general emergency with an evacuation of the entire 10-mile EPZ during non-school hours; and an immediate general emergency with an evacuation of the entire 5 mile area during a school day. Tr. 8133-36 (Lieberman).

each schedule could be met exactly. See Tr. 8136 (Lieberman). In the extreme case of an immediate general emergency with an evacuation of the entire EPZ during a school day, buses would be delayed in arriving at transfer points; however, the automobile-owning public evacuation would also be delayed as a result of delays in positioning traffic guides. Tr. 8116-18 (Weismantle, Lieberman). Accordingly, the uncontrolled evacuation time estimates would control and protective action recommendations made using those estimates would still minimize doses to the transit-dependent population. Id.

514. The route times which underlie the bus schedules were based on the lesser of conservative travel speed assumptions or calculated speeds from the DYNEV model. Cordaro et al. (Contention 67), ff. Tr. 7980, at 18-19; Tr. 8102-06 (Lieberman). Since the Board has already found that the DYNEV results are reasonable, we conclude that the route times are also.

515. As LILCO witnesses pointed out, the 15 minute clearance time applies only to the last buses leaving the EPZ. Cordaro et al. (Contention 67), ff. Tr. 7980, at 19; Tr. 8125-27 (Lieberman). Since these trips will occur at about the same time as, or slightly after, the last car has left the EPZ and will be short (3 or 4 miles) in distance, the 15 minute estimate is reasonable.

Transfer Points (67.D)

516. In Contention 67.D, Suffolk County asserts that transit-dependent individuals will potentially be exposed to health-threatening doses of radiation as a result of the location of the eleven transfer points and the lack of effective sheltering at those facilities. Four of the eleven transfer points are located within the EPZ at distances from 6 1/2 to 7 miles from the

Shoreham plant; the remaining seven are located outside the EPZ at distances from 10 to 14 miles. Cordaro et al. (Contention 67), ff. Tr. 7980, at 20. However, the location of transfer points, and for that matter the sheltering characteristics of any buildings located on them, is unimportant since evacuees will not be kept waiting more than a matter of minutes at these points. Id. at 21-22. Most passengers will simply depart the transfer point on the same bus on which they arrived. Other passengers will simply transfer from an arriving route bus to a waiting transfer bus. There will be no long lines awaiting buses, contra Acquario et al., ff. Tr. 8284, at 15, nor will there be a need for buildings to shelter passengers for radiation or the elements, contra id.

Letters of Agreement: Transfer Points (24.1)

517. In Contention 24.1, Suffolk County alleges that the LILCO Plan does not include agreements with the owners of designated transfer points not owned by LILCO, and therefore there is no assurance that LILCO would be permitted to use the areas relied upon in the Plan as transfer points. For the reasons stated below, we find that LILCO has appropriate agreements with the owners of transfer points and therefore that Contention 24.1 is without merit.

518. LILCO has obtained written agreements with owners of the properties relied on in the Plan and not owned by LILCO, allowing LILCO to use those properties as transfer points. Cordaro et al., Tr. 4/6/84 Vol. II, at 15-18, Att. 22.A-22.G, and ff. Tr. 6467, Att. 22.H. While these agreements were obtained after completion of Revision 3 of the LILCO Plan, and therefore are not included in it, Tr. 6504, 6505, 6511, 6513-14 (Robinson), they will be included in future revisions to the LILCO Plan.

519. We therefore conclude that, contrary to the allegations in Contention 24.1, the transfer points relied upon in the LILCO Plan would be available for use in an emergency.

Letters of Agreement: Buses (24.F.2)

520. The dispute on Contention 24.F.2 can be distilled into the simple question of the level of detail required by NUREG-0654 for letters of agreement. Testimony by LILCO witnesses revealed that LILCO has signed letters of agreements for 1,236 40-passenger school buses. Cordaro et al., Tr. 4/6/84 Vol. II, at 7. New York State witness Failla suggests that if literally construed, the letters of agreement cover a smaller number of buses.^{105/} See Failla, ff. Tr. 9948, at 2-3. Mr. Failla based this conclusion on a simple matching of the number of buses committed by a given contract with the New York State records of the buses owned by the contracting company. See Tr. 9953-54, 9959-60 (Failla). LILCO witness Robinson testified without contradiction that this exercise failed to account for buses owned by subsidiaries, or associated companies, of the contracting company, which LILCO and the contracting company had implicitly included within the contract. Tr. 9988-91, 10,006-07 (Robinson). Had those companies been included, then the number of licensed buses would have matched or exceeded those committed under the letters of agreement. See Tr. 9989 (Robinson); Failla, ff. Tr. 9948, at 2. Mr. Failla agreed that buses were commonly owned by a single individual or entity under various corporate names for tax purposes. Tr.

^{105/} Mr. Failla did not present an alternative, aggregate value, since he reviewed only a portion of the letters of agreement. Failla, ff. Tr. 9948, at 2 n.1; Tr. 9960 (Failla).

9975-76 (Failla). Thus, the issue is whether the Board should accept the letters of agreement based on the spirit of those agreements, or should require the agreements to be revised to reflect all contracting parties, including subsidiaries.

521. The Board finds that NUREG-0654 II.C.4 does not require the ritualistic trappings suggested by New York State. The letters of agreement identify the bus companies that will be relied upon in case of an emergency; these letters commit more buses than are required by the Plan; retainers are periodically paid for the buses specified in the letters, see Tr. 9988 (Robinson). Thus, the Board finds the letters of agreement for buses acceptable.

X. RELOCATION CENTERS (24.O, 24.P, 74, 75, 77)

A. Centers for the Public (24.O, 24.P, 74, 75)

522. Contentions 24.O, 24.P, 74, and 75 raise the following issues regarding public relocation centers for evacuees from an emergency at Shoreham: (a) LILCO does not have an agreement with the American Red Cross to provide the services relied upon from the Red Cross regarding relocation centers for Shoreham (Contention 24.P); (b) at least one of the centers designated in Revision 3 of the LILCO Plan, Suffolk County Community College, is not available for use by LILCO due to the County's refusal to make it available, and therefore a portion of anticipated evacuees have no relocation center to go to (Contention 24.O); (c) the designated relocation centers are within 20 miles of the Shoreham site, contrary to NUREG-0654 Section II.J.10.h (Contention 74); and (d) the relocation centers do not have sufficient capacity or facilities for the number of evacuees who may require

shelter (Contention 75). For the reasons stated below, we find that the letters of agreement and plans for relocation centers described by LILCO in its testimony are adequate, assuming that a public reception center is identified in the LILCO Plan and public information materials, and that the Plan is revised to reflect the changes described in the testimony.

Background

523. The issue of relocation centers has had a long and stormy course in this proceeding. LILCO and Suffolk County each filed direct written testimony on Contentions 24.O, 24.P, 74, and 75 on March 2, 1984; those contentions dated to Revisions 0 through 3 of the LILCO Plan, which relied upon five named relocation centers in Suffolk County, three of which are State and County buildings, with the American Red Cross, Suffolk County Chapter providing services at the relocation centers. Cordaro et al., ff. Tr. 14,707, at 13-14.

524. The issues were scheduled for hearings, and the original LILCO testimony on Contentions 24.O and 24.P was heard, see Cordaro et al., Tr. 1/6/84 Vol. II, at 23-27, Tr. 6358-64, 6368-71 (Robinson), but shortly before the remaining issues were heard, the American Red Cross informed LILCO that SUNY-Stonybrook and Suffolk County Community College, previously relied upon by LILCO in its Plan, had to be changed, because State and County officials refused to make the facilities available to the Red Cross for use in emergency planning for Shoreham. Cordaro et al., ff. Tr. 14,707, at 13-14. By agreement of the parties, the relocation center issues were taken out of the sequence of issues to be heard, see Tr. 9573-74; after the parties were unable to agree upon a schedule for filing additional testimony, the

Board ordered on June 8, 1984 that LILCO file supplemental testimony on June 15 and the County on June 26. In its supplemental testimony on June 15, LILCO announced changes to the Plan (previously discussed in correspondence among the parties), which included reliance upon the BOCES II Occupational Center, SUNY-Farmingdale, St. Joseph's College in Patchogue, and Dowling College as relocation centers. The June 26 revised testimony filed by the County consisted primarily of two letters, one from the District Superintendent of BOCES II and one from the president of SUNY-Farmingdale, disavowing any intention to allow their facilities to be used as relocation centers in offsite emergency planning for Shoreham, see Harris and Mayer, ff. Tr. 14,870, at 2, Att. 2, 3;^{106/} LILCO and the Red Cross had not seen either letter prior to their being filed. Tr. 14,789-90, 14,839-40 (Robinson, Rasbury). Due to this new round of refusals by State and County officials to make buildings available, the Board allowed LILCO to withdraw its previously filed testimony on Contentions 24.O, 74, and 75, including the supplemental testimony filed on those issues on June 15, and to replace that testimony with the revised relocation center testimony that eventually was heard in the proceeding. See Cordaro et al., ff. Tr. 14,707. The new

^{106/} Suffolk County witnesses Harris and Mayer cite these letters for the proposition that the two facilities are not available as relocation centers "to implement the LILCO Plan in the event of a radiological emergency at Shoreham." Harris and Mayer, ff. Tr. 14,870, at 2. Witnesses on behalf of LILCO testified, however, that in an actual emergency, these and other facilities would be available. Cordaro et al., ff. Tr. 14,707, at 15; Tr. 14,790-92 (Robinson), 14,860 (Rasbury). This view was borne out by testimony from the authors of the two letters, who were subpoenaed by LILCO and stated on cross-examination that they would entertain requests during an emergency for their facilities to be used as reception centers. Tr. 14,945-47 (Cipriani), 15,024-27 (Hines).

testimony changes the scheme by which planning will be accomplished for relocation centers, moving the entire relocation center operation to Nassau County due to the continued political problems in obtaining large (usually public) buildings for use as relocation centers in Suffolk County, where the County and the State are opposing the operation of the nuclear power plant. See Tr. 6362-63, 14,783-85 (Robinson). In deciding that LILCO's present approach to relocation centers is adequate, we have taken into account that while there are facilities closer to the EPZ that may be suitable as relocation centers, they are not available to LILCO as a result of the political position of Suffolk County and New York State on Shoreham.

Reception and Congregate Care Centers

525. In its revised approach, LILCO continues to rely upon the American Red Cross to provide relocation centers during an emergency at Shoreham, pursuant to written agreements with the American Red Cross. Cordaro et al., ff. Tr. 14,707, at 15, Att. 1-3. LILCO will designate in Nassau County one central location (or more, if necessary) called a "reception center," to which all evacuees will be directed in public information materials. Id. LILCO will perform monitoring and, if necessary, decontamination at the reception center; the American Red Cross will then send evacuees needing public shelter to congregate care centers in the Nassau area, taken from a list of such centers with which the Red Cross has written agreements to provide shelter during emergencies. Id. at 15-16, Att. 1, at 1, Att. (unnumbered); Tr. 14,805 (Rasbury); see Tr. 14,761-63, 14,779 (Rasbury). Congregate care centers will be operated by the Red Cross following their usual procedures for disaster response that have been implemented many

times in emergency situations. Tr. 14,747 (Rasbury). No monitoring or decontamination will be done at the congregate care centers; those activities will take place at the central reception center only. Tr. 14,807-08 (Weismantle). In addition, people will not be sheltered overnight at the reception center, Tr. 14,801-02, 14,812-13 (Rasbury). LILCO has committed to modify future revisions of the LILCO Transition Plan to reflect these new provisions regarding relocation centers. Cordaro et al., ff. Tr. 14,707, at 16.107/

Letters of Agreement

526. The American Red Cross, Nassau County Chapter, has a letter of agreement with LILCO to provide staff, food, beds, medical care, case work services, personal counseling, shelter, and other aid in accordance with the LILCO Plan. Id. at 17-18, Att. 1; Tr. 14,719-20 (Robinson). The American Red Cross will provide a representative at the LERO EOC, in addition to setting up its own operation center in Nassau County at the Red Cross building. Id. at 18; Tr. 14,818-20 (Rasbury, Robinson). Red Cross personnel have participated in drills for Shoreham and other nuclear power plants in New York and Connecticut, Tr. 14,748 (Rasbury), and will continue to do so, Tr. 14,748-49 (Rasbury). Nassau and Suffolk Red Cross personnel participated in making a LERO training tape, which was later shown to Red Cross personnel in Suffolk and Nassau. Tr. 14,751 (Robinson, Rasbury), 14,820 (Rasbury).

107/ The County witnesses found both the old approach and the new approach inadequate, Tr. 14,896-97 (Mayer), but were unable to describe what approach would satisfy them except to say that an adequate plan "would take into account all the contingencies," would "be flexible," and would "spell out in great detail and dot every 'i' and cross every 't'." Tr. 14,899 (Harris, Mayer). These guidelines are, of course, inconsistent with each other.

527. The American Red Cross, Suffolk County Chapter, also has an understanding with LILCO to respond during an emergency at Shoreham. Cordaro et al., Tr. 4/6/84 Vol. II, Att. 25-26; Cordaro et al., ff. Tr. 14,707, Att. 2, 3; Tr. 14,719-20, 14,751-55 (Robinson), 14,757-58 (Rasbury); see Tr. 6368-71 (Robinson). The Red Cross has been unsuccessful in its attempts to obtain shelters in Suffolk County for use during a Shoreham emergency, due to the political position of the State and County on Shoreham. Tr. 14,727-28, 14,731-32 (Robinson), 14,728, 14,730-31 (Cordaro). The Director of the Suffolk County Chapter of the American Red Cross did not wish to testify in this proceeding due to the potential political ramifications that testifying might have on her ability to function in her position in Suffolk County, Tr. 14,720-22 (Robinson), but Mrs. Robinson from LILCO and Mr. Rasbury from the American Red Cross testified that the Director of the Suffolk Red Cross had told each of them on separate occasions that the Suffolk County Red Cross would respond during an emergency at Shoreham, Tr. 14,719-22 (Robinson), 14,723, 14,725-26, 14,820 (Rasbury, Robinson). In addition, Suffolk Red Cross personnel are equipped with LERO pagers. Tr. 6480 (Robinson).

528. There is no question, based upon the past performance of the American Red Cross and upon Mr. Rasbury's testimony, that the Red Cross will provide shelters should an emergency occur at Shoreham. See, e.g., Tr. 14,856-58 (Rasbury). The County concedes that "it is [not] inappropriate for LILCO to rely on the American Red Cross because the American Red Cross has a good record in dealing with all sorts of natural disasters." Tr. 14,878 (Harris).

Capacity

529. The LILCO Plan conservatively estimates that about 32,000 people, or 20% of the population in the 10-mile EPZ, will seek shelter. Cordaro et al., ff. Tr. 14,707, at 18-20. We find that this number for capacity is reasonable, based on past experience in disasters and the Suffolk County planners' own conclusion that 20% is a good planning number. See id.; see Tr. 14,821 (Robinson). The facilities that have written agreements with the Nassau County American Red Cross, and from which the Red Cross will choose shelters at the time of an emergency, have a combined capacity of up to 48,000 people in Nassau County alone, assuming 60-65 square feet per individual pursuant to Red Cross standards. Cordaro et al., ff. Tr. 14,707, at Att. 1, at 2; Tr. 14,744-46 (Rasbury). The County testified that 60 square feet is adequate. Tr. 14,886-87 (Harris).

Location of Centers

530. As to location, all of the congregate care centers that will be used by the American Red Cross at the time of an emergency, with the exception of the SUNY-Farmingdale facility, are in Nassau County; all are beyond 20 miles from the Shoreham site. Cordaro et al., ff. Tr. 14,707, at 20-21. The American Red Cross letter of agreement with LILCO states specifically that any congregate care centers designated at the time of an emergency by the Red Cross would be 20 miles or more from the Shoreham site. Id. at 20-22, Att. 1. Therefore, we conclude that LILCO meets NUREG-0654 Section II.J.10.h regarding the congregate care centers. While the location of the reception center has not yet been identified, negotiations are ongoing and a suitable facility will be identified. Id. at 15; Tr. 14,792-93 (Rasbury).

Adequate Facilities

531. Finally, the allegation that the relocation center facilities may not have adequate space, toilet and shower facilities, food, drinking water, sleeping accommodations, and other necessary facilities is without merit. Mr. Frank Rasbury, an American Red Cross representative and Director of the Nassau County Chapter of the American Red Cross, stated that American Red Cross standards have been used in choosing the buildings the Red Cross relies upon for congregate care centers, including consideration of adequate parking space, food, toilets, and showers for people who may be seeking shelter there. Id. at 23. A "shelter profile" containing this facility-specific information is worked up for each facility relied upon by the American Red Cross. Tr. 14,777-78 (Rasbury). While most facilities are not perfect as regards all the items on the Red Cross checklist, all of those used are satisfactory for emergency shelter. Cordaro et al., ff. Tr. 14,707, at 23-24; see Tr. 14,778-80 (Rasbury). The Red Cross chooses, from among those available in the community, the buildings that most closely meet the ideal for use during a disaster. Cordaro et al., ff. Tr. 14,707, at 23-24; Tr. 14,775-76 (Rasbury).

Conclusion

532. We find as to Contentions 24.O, 24.P, 74, and 75 that (1) the letters of agreement and understanding between LILCO and the American Red Cross are adequate to provide assurance that the Red Cross will perform the duties relied upon in the LILCO Plan; (2) the locations of congregate care centers meet the guidelines of NUREG-0654, since all of them will be 20 miles or more from the Shoreham site; (3) the congregate care centers to be

provided by the American Red Cross have sufficient capacity to house the expected evacuees; and (4) there is adequate assurance that the facilities relied upon for shelters will be suitable for that purpose. The LILCO Plan is therefore adequate, provided that (1) the Plan is revised to reflect the changes in the testimony on these issues, and (2) a reception center is designated in the LILCO Plan and public information materials.

B. Thyroid Monitoring
Equipment at Relocation Centers (77)

533. The County contends that the thyroid monitoring equipment to be used at relocation centers is not sufficiently sensitive to accurately detect 150 cpm in the presence of background readings that are likely to exceed 50 cpm

534. OPIP 3.9.2 of the Plan provides that an Eberline RM-14 survey meter with HP-270 probe will be used to measure thyroid contamination levels at relocation centers. Cordaro et al., ff. Tr. 13,755, at 5, Att. 3. An RM-14 meter with a tungsten shielded HP-210 probe will also be used at relocation centers when a more sensitive instrument is appropriate, e.g. when elevated background radiation levels are indicated and to monitor childrens' thyroids. Id. at 9-10, Att. 4; Tr. 13,756-62 (Daverio, Miele). The RM-14 meter with tungsten shielded HP-210 probe is between three and four times more sensitive than the RM-14 meter with HP-270 probe and can detect thyroid contamination in background radiation fields at least four times greater than would be possible with an RM-14 with HP-270 probe. Id. Tr. 13,787-92 (Miele). Use of the tungsten shielded HP-210 probe is not presently provided for in OPIP 3.9.2, but its use at relocation centers and the appropriate implementing procedures will be reflected in future revisions of the Plan. Cordaro et al., ff. Tr. 13,755, at 9.

535. The Board notes at the outset that the County's presumption that background radiation levels at relocation centers are likely to exceed 50 cpm is highly questionable. At the time Suffolk County drafted Contention 77, two of the relocation centers upon which LILCO was relying were less than 15 miles from the Shoreham Station. See Contention 74. All of the relocation centers upon which LILCO presently relies, however, are more than 20 miles from the Shoreham Station. Cordaro et al., ff. Tr. 14,707, at 20-21, Att. 1. The FEMA witnesses testified that it is extremely unlikely that background radiation levels at relocation centers more than 20 miles from Shoreham would ever exceed 50 cpm. Tr. 14,578 (Keller). Moreover, Mr. Keller testified that the concern about potential elevated background radiation levels is raised by the possibility that persons could track in contamination that might become dislodged. Tr. 14,279-80 (Keller). This problem, however, is addressed in the LILCO response planning.

536. Under OPIP 3.9.2 of the LILCO Plan, people will not have their thyroids monitored until after the whole body scan has been performed and it is determined either that they are not contaminated or that they are decontaminated. Tr. 14,280 (Keller). Moreover, monitoring personnel are instructed to contact the Decontamination Leader if the average background is greater than 50 cpm and that it may be necessary to move the monitoring station to insure that accurate readings can be obtained. Babb et al., ff. Tr. 11,140, at Att. 20, Module No. 10 (Radiological Monitoring and Decontamination) at 6; Tr. 14,278-79 (Keller).^{108/} Mr. Keller testified that

^{108/} The Board notes that section 5.3.3 of OPIP 3.9.2 instructs monitoring personnel to "[e]nsure decontamination facility/relocation center background

radiation monitoring personnel also could take measures to remove the contaminants before moving the thyroid monitoring station. Tr. 14,278-79 (Keller). During the graded exercise, FEMA will simulate a situation where background radiation levels exceeded 50 cpm and will evaluate the response of monitoring personnel. Id.

537. Even though thyroid contamination monitoring is extremely unlikely to be conducted in the presence of background radiation levels exceeding 50 cpm, the Board finds that LILCO's procedure for use of the RM-14 meter with HP-270 probe is presently inadequate in three respects: first, the procedure indicates that the background reading should be taken with the shield of the HP-270 probe open when it should actually be taken with a closed shield, Tr. 13,777-80 (Miele), 13,794 (Daverio), 14,287-89 (Keller); second, the procedure does not indicate that the meter is to be set for a fast response time, Tr. 13,763-64 (Miele); and third, the procedure does not presently include special provisions for monitoring the thyroids of children, Tr. 13,795 (Daverio). LILCO testified, however, that OPIP 3.9.2 would be revised (1) to indicate that both the background radiation and thyroid contamination HP-270 readings are to be conducted with a closed shield, Tr.

(footnote continued)

radiation levels remain less than 50 cpm. This is especially important where monitoring is performed to maintain RM-14 sensitivity." In LILCO's written testimony, however, it is stated that this provision was included inadvertently and will be removed in future revisions of the Plan. See Cordaro et al., ff. Tr. 13,755, at 9. Because removal of this provision from the Plan is inconsistent with the training of monitoring personnel, and because FEMA believes it would not be prudent to allow background radiation levels to get much above 50 cpm, Tr. 14,280-81 (Keller), the Board directs that LILCO leave this provision in the Plan.

13,794 (Daverio), (2) to indicate that the RM-14 meter with HP-270 probe is to be set on a fast response time, Tr. 13,795 (Daverio), and (3) to include special provision for monitoring children with an HP-210 probe, id.

538. The Board finds that, with the changes indicated above, there is reasonable assurance that persons will be adequately monitored for thyroid contamination under the LILCO Plan. LILCO's Plan to use the more sensitive tungsten shielded HP-210 probe in conjunction with the HP-270 probe provides additional assurance that persons with contaminated thyroids will be identified.^{109/}

539. As for the County's claim that the Plan provides that persons are to be sent to a hospital only when thyroid contamination exceeds 150 cpm over background and its concern that monitoring personnel will not be able to detect 150 cpm above background when the meter is set on fast response, the Board finds that these concerns are insufficient to warrant a conclusion that the public health and safety will not be adequately protected.

540. Mr. Miele testified that the thyroid scan at relocation centers is intended to provide more of a qualitative measure of the thyroid contamination level than a quantitative measure and that monitoring personnel are intent primarily on determining if the dose to the thyroid has been substantial enough to warrant concern. Cordaro et al., ff. Tr. 13,755, at 8-9; Tr. 13,772-77 (Miele). Mr. Miele also testified that monitoring personnel are being trained to view the 150 cpm threshold as a qualitative rather than a quantitative guideline. Tr. 13,774-76 (Miele).

^{109/} The County did not elicit any testimony on cross-examination to challenge the capacity of the RM-14 meter with tungsten shielded HP-210 probe to detect thyroid contamination in the presence of background readings exceeding 50 cpm. See Tr. 13,787-92 (Miele).

541. Both the LILCO and FEMA witnesses testified that there will always be uncertainty regardless of the contamination level or who does the monitoring and that monitoring personnel will have to exercise judgment. Tr. 13,774-76 (Miele); Tr. 14,274-75 (Keller). FEMA testified, however, that it would be extremely unlikely that readings by monitoring personnel would be so inaccurate as to endanger the public's health and safety. Tr. 14,276-77 (Keller). Therefore, even if it is true that there will be some variance in the reading when the RM-14 meter is set for a fast response, see Tr. 13,768 (Miele), it does not raise a concern sufficient to warrant the conclusion that the public health and safety will not be adequately protected.

XI. THE HANDICAPPED, HOSPITALS, NURSING HOMES

A. Ambulances (24.G, 24.K)

542. In Contentions 24.G and K, the Intervenors contend that (a) LILCO has no agreements with ambulance companies to provide the number of ambulances and ambulettes relied upon in the LILCO Plan; and (b) LILCO has no agreements with ambulance companies to provide necessary drivers, medical, and paramedical support services in the vehicles to be used in evacuating special facilities and the handicapped. For the reasons stated below, we find that LILCO does have appropriate agreements with ambulance companies to cover these items.

Availability and Adequacy

543. LILCO has agreements with ambulance companies for a total of 63 ambulances and 130 ambulettes to be used during an evacuation of the 10-mile EPZ at Shoreham. Cordaro et al., Tr. 4/6/84 Vol. II, at 7-10. The contracts

with ambulance companies provide that vehicles will be available in an emergency at Shoreham on a priority basis. In addition, most privately-owned ambulances contracted for by LILCO normally are used for prearranged transportation; community and fire district ambulances are used to respond to life-threatening situations. Consequently, prior commitments by the ambulance companies will not affect LILCO's response in an emergency. Id. at 10-11, Att. 13-21.C, at 7-8; Tr. 6431-40 (Robinson).

544. The 63 ambulances and 130 ambulettes are adequate to accomplish an evacuation within the parameters of the LILCO Plan, with each ambulance and ambulette required to make no more than two trips on the average. Id. at 11-12. In addition, the vehicle estimates in the Plan are conservative, because (1) Appendix A, IV-175 assumes that four people maximum can travel in ambulettes and the vehicles obtained by LILCO on average will hold seven people, Tr. 6420-22, 6469-71 (Robinson); (2) some ambulances will hold three or four people, although the Plan provides for only two people per ambulance, Tr. 6422 (Robinson); and (3) LILCO is recommending sheltering rather than evacuation to one nursing home in the EPZ due in part to the greater health risks those patients face in being moved. Cordaro et al., Tr. 5/10/84 Vol. II, at 18. We find, however, that even assuming conservative estimates of capacities for ambulances and ambulettes, the number of vehicles provided under LILCO's contracts with ambulance companies will be sufficient to accomplish evacuation in a timely manner.

545. The planning basis of the LILCO Plan does not contemplate evacuation of the three hospitals on the edge of the Shoreham EPZ at the same time as the rest of the EPZ, contrary to the implication in Contention 24.G,

and therefore one need not take into account the number of ambulances and ambulettes required to evacuate those patients in determining whether the number contracted for is adequate. Cordaro et al., Tr. 4/6/84 Vol. II, at 12; Tr. 6442-45 (Weismantle). In the unlikely event that hospitals choose to evacuate their patients rather than shelter them, hospital patients will be moved using the vehicles contracted for, after the homebound and nursing and adult home residents have been relocated. Cordaro et al., Tr. 4/6/84 Vol. II, at 13.

Manning Vehicles

546. Personnel to man ambulances and ambulettes are provided as appropriate pursuant to the contracts between LILCO and the ambulance companies. Cordaro et al., Tr. 4/6/84 Vol. II, at 18, Att. 13-21.C; Tr. 6423-24, 6517-23 (Robinson). The contracts clearly stipulate that the ambulances and ambulettes provided shall be manned by drivers and medical technicians where appropriate, Cordaro et al., Tr. 4/6/84 Vol. II, at Att. 13-21.C, at 1-2; Tr. 6533-34 (Cordaro, Robinson), and that the drivers "shall be duly licensed and shall have received emergency preparedness training prior to vehicle operation," Cordaro et al., Tr. 4/6/84 Vol. II, Att. 13-21.C, at 2. While Contention 24.K suggests that agreements with individual employees are necessary to indicate that those individuals will be providing the services described in the LILCO Plan, we find that agreements with individuals are not required by NUREG-0654 and unnecessary in fact, and that in any event, the provisions cited above in the contracts with ambulance companies provide assurance that the personnel relied upon in the LILCO Plan will be provided.

B. Hospitals, Nursing Homes (24.J, 24.N, 72)

Letters of Agreement with Special Facilities (24.J)

547. In Contention 24.J, the Intervenor's assert that the LILCO Plan must contain agreements with nursing and adult homes, nursery schools, hospitals, and other special facilities in the EPZ because (1) these facilities are "support organizations having an emergency response role" within the meaning of NUREG-0654, Section II.A.3., and (2) without such agreements, there is no assurance of the willingness of these special facilities to implement an evacuation as proposed in the LILCO Plan. LILCO concedes that such agreements do not exist. Cordaro et al., Tr. 5/10/84 Vol. II, at 7; Tr. 9031 (Robinson). For the reasons stated below, we conclude that letters of agreement with these special facilities are not necessary.

548. First, the hospitals, nursing homes, adult homes, nursery schools, and special facilities referenced in Contention 24.J are not "support organizations" within the meaning of the NRC regulations. Cordaro et al., Tr. 5/10/84 Vol. II, at 7; Tr. 6563, 9032-33 (Robinson). Agreements stating that the facilities will implement protective actions as recommended by LERO therefore are no more necessary than agreements of that sort from each household within the EPZ. Cordaro et al., Tr. 5/10/84 Vol. II, at 7-8. The special facilities, contrary to the assertions in the Intervenor's contention, would seek help from LERO during an emergency, not give it. Cordaro et al., Tr. 5/10/84 Vol. II, at 8.

549. Second, the record shows that these facilities have been involved in planning for an emergency in the Shoreham EPZ. LILCO has visited each of the facilities referenced in Contention 24.J; has provided tone alert radios

to each of the facilities (one nursery school refused to accept it); is working with the facilities to develop each facility's plans for an effective response during an emergency including developing facility-specific plans and procedures for sheltering and evacuation, which were discussed at length during the course of the hearings; is offering training to the employees of each facility; and stands ready to offer additional help to any facility within the EPZ requesting it. In addition, LILCO has obtained sufficient equipment and personnel to transport hospital patients, residents of handicapped facilities, adult homes and nursing homes, and nursery school children should it be necessary to evacuate these people in an emergency. Cordaro et al., Tr. 5/10/84 Vol. II, at 8-9. Consequently, Contention 24.J is without merit to the extent that it suggests that without letters of agreement there is no assurance that special facilities are involved in the emergency planning process.

Evacuation Time Estimates for Special Facilities (72.A)

550. In Contention 72.A, the Intervenor's assert that the evacuation of special facilities will be too lengthy to provide adequate protection from radiation doses. Specifically, Intervenor's contend that evacuation will be delayed because (1) large numbers of trips will be required to transport persons to relocation centers, (2) evacuating vehicles will encounter heavy congestion from mobilization and evacuation traffic, and (3) time will be required to load and unload passengers from special facilities. The Board concludes that LILCO's evacuation time estimates for special facilities are reasonable and account for the three concerns raised by Intervenor's in Contention 72.A. These evacuation times indicate that special facilities will be evacuated in

approximately the same time as the general population; thus, their residents will be provided adequate protection from health-threatening radiation doses.

551. LILCO witnesses presented detailed evacuation time estimates for each of the special facilities in the EPZ. Cordaro et al., ff. Tr. 9101, at 5-6, Att. 2. The estimates were calculated by summing the times required to complete a series of discrete steps. Id. at 6. These steps included: the time at which evacuation vehicles arrived at staging areas; the time needed to travel from the staging area to the special facility; the time needed to load passengers at the facility; the time needed to reach the EPZ boundary; and, for multiple run cases, the times to travel to and from reception centers. Id. at 6-7. The time required to complete each step was calculated using conservative assumptions about such factors as mobilization times, travel speed (both concurrent and countercurrent to evacuating traffic), and passenger loading rates. See id. at 7-9.

552. The evacuation time estimates revealed that, with the exception of the Suffolk Infirmary, special facilities could be evacuated before the last member of the automobile-owning public leaves the EPZ. Id. at 10. Since protective action recommendations are designed to minimize radiation dose and are keyed to the time needed to evacuate the automobile-owning public, the Board concludes that evacuation of special facilities will be timely and will provide protection from health-threatening doses of radiation. Id. The Suffolk Infirmary, which is located near the EPZ boundary, has favorable sheltering characteristics that protect its residents from health-threatening radiation doses. Id.

Relocation Centers for Special Facilities (24.N, 72.C)

553. The Intervenor contend in Contention 24.N that (1) relocation centers for school children,^{110/} patients in hospitals, handicapped individuals, and residents of special facilities have not been identified, and (2) no letters of agreement exist for facilities relied upon as relocation centers for special facilities. In Contention 72.C, the Intervenor contend that the LILCO Plan fails to identify reception centers for persons evacuated from hospitals, nursing homes, or other special health care facilities in the EPZ, other than the United Cerebral Palsy of Greater Suffolk, Inc.

554. As to letters of agreement with reception centers generally, LILCO will identify in the Plan the reception centers for special facilities, but does not intend to enter into letters of agreement with these facilities. Instead, the LILCO Plan contemplates that each of the special facilities will make arrangements directly with reception centers, with LILCO helping to locate reception centers for those facilities needing assistance. Cordaro et al., Tr. 5/10/84 Vol. II, at 11; Tr. 9087 (Robinson). LILCO is working closely with facilities to assist them in finding reception centers, Tr. 9087 (Robinson), but it is the facilities' responsibility and decision as to what would be suitable reception centers for particular groups. Id. at 9087-88 (Robinson). LILCO is not aware of any plans that include agreements between either the utility or the locality and reception centers for special facilities, Tr. 9089 (Weismantle), and no other party presented evidence that this was the case elsewhere. We find that there is no requirement that LILCO enter into

^{110/} The issue of reception centers for school children is also raised in Contention 71; it is addressed below as part of that Contention.

agreements with reception centers for special facilities or include agreements in the LILCO Plan. Identification in the LILCO Plan of the reception centers arranged by these special facilities is a ministerial detail that can be confirmed by the Staff.

Hospitals

555. As to identification of reception centers for hospital patients, LILCO has contacted hospitals outside the EPZ to determine whether they would accept patients from the three hospitals within the EPZ if necessary. While the hospitals outside the EPZ have indicated that they would accept as many patients as possible in an emergency, they cannot commit to exact numbers ahead of time due to the flux of hospital patient populations from day to day, both in number and the kind of care required. Cordaro et al., Tr. 5/10/84 Vol. II, at 15. Thus, LILCO will include in the Plan a list of hospitals that could serve as reception centers and will be contacted at the time of an emergency, rather than a list of specific reception hospitals paired to the hospitals in the EPZ. Id. at 16.

556. We find that an identifying list provides adequate assurance that hospital patients will be protected, for the following reasons. First, LILCO has worked diligently with the three hospitals within the EPZ to identify appropriate reception hospitals. LILCO has met twice with the Nassau-Suffolk Hospital Council to discuss relocation of hospital patients, and representatives at those meetings indicated that hospitals assess their ability to accept additional patients at the time an emergency occurs. Id. at 15. Hospital patients can be prepared to begin evacuating before a final determination is made of the receiving hospitals. Tr. 9065-66 (Yedvab). Testimony from Mr.

Jay Yedvab, a LILCO consultant with 23 years of experience in health care, indicates that the unwillingness of hospitals to commit themselves in advance to a specific number of patients is usual, but that during an emergency, space at other hospitals can be found in short order by telephone. Cordaro et al., Tr. 5/10/84 Vol. II, at 15-17. Past disaster experience indicates that hospitals do everything in their power to respond to patient and community needs during emergencies, id.; evacuated patients appear on doorsteps of hospitals without "discussion of whether they were notified in advance or whether all of the niceties had been followed." Tr. 9066 (Yedvab). The implication that it would take a fairly long time to get responses from hospitals is not borne out by experience in disasters. Id. Even hospitals that are "full" can find space to receive emergency evacuees. Tr. 9069 (Weismantle).

557. Second, all hospitals and nursing homes are required by the New York State Hospital Code Chapter 5 (10 NYCRR Section 702.7) to have written emergency and disaster preparedness plans rehearsed and updated at least twice a year, which include the reception and treatment of patients in emergencies or disasters that might occur within the hospitals or outside them. Cordaro et al., Tr. 5/10/84 Vol. II, at 16-17; Tr. 9074 (Glaser), 9088 (Yedvab). The Joint Commission on the Accreditation of Hospitals also requires disaster plans for an emergency situation, such as an accident at Shoreham. Cordaro et al., Tr. 5/10/84 Vol. II, at 16-17; Tr. 9069 (Yedvab).

558. Third, the LILCO Plan has procedures for finding reception hospitals for patients during an emergency, including lists of hospitals in the Long Island area and their telephone numbers. The task of calling those hospitals is assigned to LERO staff. Cordaro et al., Tr. 5/10/84 Vol. II, at 16.

LILCO has also pledged to continue working with the three hospitals in the EPZ to develop evacuation plans and procedures, so that evacuation of patients would proceed as efficiently as possible were it necessary to evacuate hospitals. Cordaro et al., 5/10/84 Vol. II, at 16-17.

559. Finally, as discussed in response to Contention 72.D below, sheltering is the primary protective action for hospitals. Even if evacuation became necessary, the likelihood that all three hospitals and Suffolk County Infirmary would have to be evacuated during an emergency at Shoreham, given their dispersed geographic locations, is very low. Tr. 9067-68 (Weismantle).

560. In light of this information, we find that LILCO is not required to identify specific reception hospitals for specific EPZ hospitals in the Plan or to obtain letters of agreement with hospitals outside the EPZ for the relocation of EPZ hospital patients should they be evacuated during an emergency at Shoreham. The level of detailed planning for hospitals by LILCO provides adequate assurance that protective actions in the hospitals can and will be taken in the event of a radiological emergency, assuming that a final list of prospective reception hospitals is included in the LILCO Plan. That is a ministerial task that can be confirmed by the Staff.^{111/}

^{111/} The Suffolk Infirmary is being treated in the same way as hospitals for emergency planning purposes due to the higher level of shielding provided by the building, the level of medical care required by patients in that facility, the distance of the infirmary from Shoreham (approximately 10 miles), and the possibility of trauma caused by an evacuation of the residents of the infirmary. Cordaro et al., Tr. 5/10/84 Vol. II, at 18.

Because the Infirmary is a County facility, it is not at present willing to work with LILCO to discuss protective actions for its residents, although

(footnote continued)

Nursing and Adult Homes

561. As to nursing and adult homes, the LILCO Plan contemplates that all nursing and adult homes within the EPZ would be advised to evacuate if the general public in the same zones were advised to evacuate, with the exception of Suffolk Infirmary.^{112/} Cordaro et al., Tr. 5/10/84 Vol. II, at 17. Reception centers for these facilities are marked "to be identified" in the LILCO Plan.

562. Mr. Glaser has met with the majority of the nursing homes in the area of the EPZ. With the exceptions of Suffolk Infirmary and one other nursing home, Tr. 10,069 (Robinson), they have cooperated completely in discussions regarding planning for an incident at Shoreham and intend to incorporate the work LILCO is doing on plans and procedures into their facility disaster plans. Tr. 9083 (Glaser). LILCO has been working with the Nassau-Suffolk Hospital Council, the Suffolk County Health Facilities Association, hospitals outside the EPZ, and each of the ten nursing and adult homes in the EPZ to help the special facilities identify appropriate reception centers for their patients. Cordaro et al., Tr. 5/10/84 Vol. II, at 19, Att. 9-18. LILCO will amend the LILCO Transition Plan as appropriate to include the

(footnote continued)

LILCO has attempted to work with the Infirmary to develop more detailed emergency plans to help protect residents at the Infirmary. Cordaro et al., Tr. 5/10/84 Vol. II, at 18, Att. 3-7. The only way LILCO has been able to communicate with Suffolk County Infirmary of late is through Freedom of Information Act requests. Tr. 9070 (Weismantle). To the extent that Suffolk County has difficulties with the way Suffolk Infirmary is being treated in the LILCO Plan, they have no one to blame but themselves.

^{112/} See previous note.

reception centers chosen by the adult and nursing homes within the EPZ. Id. at 20. In addition, Public Health Law 2803, Rules and Regulations Section 414.8, requires medical facilities, including nursing homes, to have written emergency plans and to engage in drills to be sure their staffs are familiar with emergency procedures. Id. at 21; Tr. 9074, 9089 (Glaser).

563. We therefore find that, assuming reception centers for the nursing and adult homes within the EPZ are identified in the LILCO Transition Plan, the provisions being made for nursing and adult homes evacuations provide adequate assurance that protective actions can and will be taken at those facilities.

Other Special Facilities

564. In addition, for the other special health care facilities mentioned in Contention 72.C, two have already identified reception centers for their facilities. Cordaro et al., Tr. 5/10/84 Vol. II, at 22, Att. 43; Tr. 9087-88 (Robinson). LILCO is working to obtain reception centers for the remaining facilities, Cordaro et al., Tr. 5/10/84 Vol. II, at 22, Att. 17, 41-42, 44-66; Tr. 9088 (Robinson), and will revise the LILCO Plan to reflect the relocation centers chosen by these special facilities. Cordaro et al., Tr. 5/10/84 Vol. II, at 22.

565. We therefore find that, assuming the reception centers for other special facilities are identified in the LILCO Plan, the planning efforts for these centers are adequate to assure that the residents will be protected during a radiological emergency at Shoreham.

Determining Whether to Evacuate Hospitals (72.D)

566. In Contention 72.D, the Intervenor asserts that the LILCO Plan (1) fails to specify the circumstances that would necessitate an evacuation of the three hospitals in the EPZ, and (2) does not include adequate procedures for those making protective action recommendations to determine whether evacuation is needed. The Intervenor alleges that the Plan therefore fails to comply with NUREG-0654, Section II.J.10.M and 10 C.F.R. § 50.47(b)(10). We conclude that the LILCO Plan adequately describes the circumstances under which hospitals might be evacuated and the procedures by which persons making that recommendation would do so.

567. EPA's manual of Protective Action Guides and protective actions for nuclear incidents acknowledges the need in certain circumstances to apply different criteria in establishing the appropriate protective action for special groups, including bedridden and critically ill patients. Cordaro et al., Tr. 5/10/84 Vol. II, at 24-25. For this reason, LERO has chosen to recommend that the three hospitals shelter rather than evacuate patients unless circumstances at the time of an accident indicate that evacuation would be prudent. Tr. 8778, 8780 (Daverio). LILCO has done extensive, detailed planning with the three hospitals regarding the implementation of protective actions in the event of an emergency at Shoreham. See Cordaro et al., Tr. 5/10/84 Vol. II, at 26, Att. 69-98.

568. Procedure OPIP 3.6.1, Section 5.3.2 of the LILCO Plan discusses the method for calculating the dose to the hospital population. Using OPIP 3.6.1, LERO calculates the sheltered dose for hospitals and nursing homes using the whole body and thyroid dose reduction factors in OPIP 3.6.1. Tr.

8871 (Watts). One can compare the sheltered dose for a hospital and the evacuation dose for the zone in which the hospital is located. Tr. 8873 (Miele). In addition, the actual dose to persons in hospitals can be determined using the dosimetry equipment installed at the hospitals. Tr. 8881-82 (Miele).

569. The Plan also provides that at the time of an accident LERO will discuss directly with the hospital the situation and the advisability of sheltering or evacuating certain people in the hospital. Factors such as release duration and probable time of evacuation of hospital patients would be discussed at that time. Tr. 8876 (Watts). This consultation may result in considering evacuation of radiosensitive hospital patients at doses below the PAG levels. Tr. 8884 (Watts).

570. The procedure provides that after the dose is calculated, LERO personnel will discuss the recommendations with hospital administrators so that they can determine the appropriate protective action. Cordaro et al., Tr. 5/10/84, Vol. II, at 24-25; Tr. 8878 (Cordaro).

"Ad Hoc" Evacuation of Hospitals (72.E)

571. In Contention 72.E, the Intervenors assert that "ad hoc" expansion of transportation resources to evacuate the three hospitals in the EPZ, specified in the LILCO Plan, does not meet the planning requirements of 10 C.F.R. §§ 50.47(a)(1) and (b)(10) and NUREG-0654 II.J.10.d. The Board finds this contention meritless.

572. As we have just found, in the vast majority of cases the three hospitals in the EPZ will be advised to shelter. Cordaro et al., ff. Tr. 9109, at 11. In addition, should evacuation be recommended, the transportation

requirements of these hospitals would need to be determined at the time of the emergency, since the patient characteristics of these hospitals change on almost a daily basis. Id. Detailed preplanning for hospital evacuations would, therefore, be of little benefit. See id. at 11-12. The Board finds that LILCO has identified adequate transportation resources for evacuating hospitals, see id. at 11-12, and has, thus, complied with 10 C.F.R. § 50.47 and NUREG-0654.

C. Registration of Handicapped (73.A)

573. Suffolk County and New York State contend that LILCO's plan for identifying handicapped persons needing assistance from LERO in an emergency is inadequate because: (1) LILCO relies on mailback registration cards to identify these persons; (2) a mailback survey is inherently inadequate, Harris and Mayer, ff. Tr. 9574, at 16-17, Tr. 7904 (Albertin), 9615-18 (Harris, Mayer), 9641-42 (Saegert); (3) the postcard and all instruments used by LILCO to identify handicapped persons are badly designed, Tr. 7904-07 (Albertin, Knighton), 9611-12, 9657-63 (Saegert); (4) persons cannot respond properly to the registration card because they have not been adequately informed what they will need to do in an emergency, Acquario et al., ff. Tr. 7854, at 8; Saegert, ff. Tr. 9574, at 4; (5) persons will not respond to the postcard because they do not want to be identified as handicapped, Saegert, ff. Tr. 9574, at 3-5; and (6) LILCO's other means of identifying handicapped persons are not workable, Tr. 7918-20 (Acquario, Albertin, Knighton), 9615-16 (Mayer).

574. NUREG-0654 II.J.10.d provides that "plans to implement protective measures for the plume exposure pathway shall include . . . means for

protecting those persons whose mobility may be impaired due to such factors as institutional or other confinement." Although there is no specific regulatory requirement for preregistering these persons, licensing boards have held that reasonable efforts to identify them are to be made. See, e.g., Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 1016 (1983).

575. OPIP 3.6.5 of the Plan provides for a working list of non-institutionalized handicapped persons who need special evacuation assistance from LERO. LILCO's program for identifying these persons includes (1) a letter asking persons with special needs, or knowing persons with special needs, to return the enclosed postpaid registration card, (2) a similar request in the Public Information Brochure, (3) an article in the LILCO newsletter, "Keeping Current," that provides an address where handicapped persons can write for assistance, and (4) an address in the Suffolk County and community telephone directories where those with special needs can write for assistance. Clawson et al., ff. Tr. 7526, at 5-8, Att. 1-2, 5-6. Both a "Keeping Current" article and the brochure with a postpaid registration card will be distributed at least annually. Id. at 7, 12-13. In addition, LILCO is checking the list of customers who have special priority for electric service restoration on the assumption that these customers may have one or more family members dependent on an electro-mechanical life support system, id. at 9, has obtained a list of hearing-impaired persons who own TTY's from the Service Bureau for the Deaf, Tr. 7603, 7663 (Robinson), has contacted both the Suffolk County Handicapped Services and Office of the Aging, Tr. 7660-61 (Robinson), and plans to contact additional organizations associated with the handicapped, id.

576. The Board finds that LILCO is making reasonable efforts to identify handicapped persons who may need assistance from LERO during a Shoreham emergency. Our conclusion is supported first by FEMA's testimony that the regulations and guidelines require only that some methodology be developed to identify handicapped persons and their special needs, that mailback registration cards are commonly used at other nuclear sites, that the applicant's only duty is to see that the cards are sent out and that any responses are not disregarded, that FEMA knows of no requirement that a mailback survey be supplemented, and that LILCO's plan to identify handicapped persons through a mailback survey is adequate. Baldwin et al., ff. Tr. 12,174, at 79; Tr. 12,933-34, 12,936-37 (Keller, Kowieski).

577. Second, operation of the Shoreham plant has been extremely well publicized on Long Island, residents of the EPZ have had a reasonable opportunity to avail themselves of the assistance LILCO has offered, and, contrary to State and County assertions, LILCO cannot be blamed if handicapped persons do not contrary to common sense and the Board's expectation take advantage of assistance offered to them. Tr. 12,933-34 (Keller); Clawson et al., ff. Tr. 7526, at 9-12.

578. Third, as for the concern that people will not respond properly to the survey because they do not understand what an evacuation entails, the Board agrees with LILCO that people have a general understanding of what is involved in an evacuation and that the Public Information Brochure will adequately supplement that understanding. See Tr. 7652-58 (Clawson, Cordaro).

579. Fourth, while the claim that the registration materials are poorly drafted warrants some consideration, especially since LILCO's witness conceded that the wording on the postcard could be improved, Tr. 10,130-31 (Mileti), the concern does not warrant the conclusion that LILCO is not making reasonable efforts to identify handicapped persons. No doubt that such materials always could be improved. It is unlikely, however, that experts could ever agree on the exact wording -- indeed, the State and County witnesses disagreed. The State testified that LILCO should simply ask persons "what special need do you have," Tr. 7916 (Albertin), whereas the County testified that use of general terms such as "special needs" are unclear to people, Tr. 9611 (Saegert).

580. Finally, LILCO's efforts to identify handicapped persons by additional means, including the "Keeping Current" article, appeals to friends, family, and neighbors to assist in locating these people, and contact with organizations for the handicapped, provide further assurance that these persons will be identified. As an added precautionary measure, there will be a designated telephone number that can be called during the emergency if a handicapped person has not preregistered but needs assistance from LERO. Tr. 7633 (Clawson).

581. The State witnesses cited what they claimed to be the 1980 census statistics regarding the numbers of handicapped and hearing-impaired persons in the EPZ to support their contention that LILCO has identified only a fraction of these people. Tr. 7856, 7863 (Acquario, Knighton). These statistics carry little weight for two reasons: first, the census definition of handicapped is very broad, see Tr. 7876-77 (Knighton), and is likely to

include persons who are not handicapped for emergency planning purposes; and second, LILCO is not trying to identify all handicapped persons in the EPZ but only those who require assistance from LERO in an emergency.^{113/} Tr. 7548-52 (Robinson). As FEMA testified, most handicapped people either live with someone or have made special arrangements for all types of emergencies. Tr. 12,934 (McIntire).

582. Provided that LILCO continues in its efforts to identify handicapped persons, the Board finds that LILCO is making reasonable efforts to identify and protect "those persons whose mobility may be impaired due to such factors as institutional or other confinement."

D. Notification and Evacuation of
Handicapped People at Home (58,73.B)

Notification of Non-Deaf Handicapped
Persons at Home (73.B.1, 73.B.3)

583. Suffolk County and New York State contend that the LILCO Transition Plan is inadequate because (1) the only provision for notifying non-deaf handicapped persons at home of a pending evacuation is by means of a telephone call from the Home Coordinator, (2) many handicapped persons cannot communicate by phone, and (3) there is no indication in the Plan that a sufficient number of people will be available to make the calls. Harris and Mayer, ff. Tr. 9574, at 14, 18-19; see also Contention 58.

^{113/} In addition, the Board takes official notice, see 10 C.F.R. § 2.743(i), of the fact that the 1980 census does not include statistics on deaf or hearing-impaired persons. The Board is at a loss to determine the basis for the State's testimony regarding 1980 census statistics on deaf and hearing-impaired persons in the EPZ.

584. The presumption in Contentions 58, 73.B.1, and 73.B.3 that the only means of notifying non-deaf handicapped persons at home of a pending evacuation is by means of a telephone call is false. Non-deaf handicapped persons at home will be notified of a pending evacuation by sirens and EBS messages along with the rest of the population in the EPZ. Cordaro et al., ff. Tr. 7698, at 8. See also Findings 332-33. Because there is no regulatory requirement for separate notification of non-deaf handicapped person at home, the County and State have failed to present a valid notification issue under Contentions 58, 73.B.1, and 73.B.3.

585. Even if the Board were to find that there are special alerting requirements for non-deaf handicapped persons at home, provisions in the Plan for special alerting of these people provide adequate assurance that their health and safety will be protected.

586. In addition to siren and EBS notification, Section 5.1.2 of OPIP 3.6.5 of the Plan provides that LERO will call handicapped persons to confirm that a vehicle is being dispatched to evacuate them. Cordaro et al., ff. Tr. 7698, at 8-12, Att. 2.

587. The number of handicapped persons to be called will depend on the number of handicapped persons identified through LILCO's preregistration program and the percentage of the EPZ being evacuated in the emergency. Cordaro et al., ff. Tr. 7698 at 9-10; Tr. 7738-41 (Robinson).

588. The Home Coordinator has primary responsibility for calling these people but may draw on communicators and administrative personnel for assistance. Cordaro et al., ff. Tr. 7698, at 9-10. There are 15 administrative support personnel, a number of communicators, and other personnel whose

responsibilities would not begin until a later stage of the emergency who could assist in making the telephone calls. Id. at 11-12; Tr. 7752-53 (Weismantle).

589. The County argues that there is no assurance that these people would be available to call handicapped persons and that the telephone calls, therefore, will take too long to permit timely evacuation. Harris and Mayer, ff. Tr. 9574, at 18-19. Mr. Weismantle testified, however, that, as Manager of LERO, he would set priorities and allocate personnel and resources for contacting the handicapped as needed. Cordaro et al., ff. Tr. 7698, at 11; Tr. 7743-44 (Weismantle).

590. The County also contends that LILCO's Plan to call handicapped persons is inadequate because they may not be near the telephone or may be unable to communicate by telephone. It is not a significant problem, however, if a handicapped person is not reached by telephone because the phone call merely provides advance notice that a vehicle has been dispatched to assist them in evacuating. Cordaro et al., ff. Tr. 7698, at 11-12; Tr. 7720 (Weismantle). Evacuation vehicles are dispatched automatically to the residences of handicapped persons whether or not they are reached by telephone. Id.

591. The Board finds that the LILCO Plan provides reasonable assurance that non-deaf handicapped persons at home will be notified in a timely fashion, and that LILCO's special alerting provisions provide additional assurance that the health and safety of these persons will be protected.

Evacuation of Handicapped Persons at Home (73.B.4)

592. Suffolk County Contention 73.B.4 asserts that the evacuation of the handicapped at home will take "far too long" and therefore expose these people to health-threatening doses of radiation. LILCO witnesses presented evacuation time estimates for this group based on the type of vehicle -- ambulance, ambulette, or bus -- that would transport these people from the EPZ. Cordaro et al., ff. Tr. 7698, at 16-17. These evacuation time estimates are the summation of the times required to complete four discrete steps:

1. The time at which equipment becomes available at the staging area to transport the handicapped from the EPZ;
2. The time needed to travel from the staging area to the location of the first stop;
3. The time needed to make all stops; and
4. The time needed to travel from the location of the last stop to the EPZ boundary.

Id. at 14. In estimating the time to complete each step, LILCO employed conservative assumptions. Id. at 14-16; Tr. 7775-76, 7779, 7782, 7792 (Lieberman). The evacuation times for the handicapped at home are virtually identical to those for the general population. Cordaro et al., ff. Tr. 7698, at 17; Tr. 7767-68 (Lieberman, Weismantle). Since protective action recommendations are designed to provide dose minimization and are keyed to the time needed to evacuate the automobile-owning public, it follows that the handicapped at home would not be exposed to health-threatening doses of radiation as suggested in Contention 73.B.4. Cordaro et al., ff. Tr. 7698, at 17; Tr. 7838 (Weismantle).

Timeliness of Notification of Deaf at Home (73.B.5)114/

593. Suffolk County Contention 73.B.5 suggests that notification of the deaf at home will be untimely because of delays caused by evacuation traffic and of insufficient numbers of route alert drivers. LILCO witnesses testified that the deaf at home represent a very small subgroup of the entire EPZ population. Cordaro et al., ff. Tr. 7698, at 17. Given the saturated roadway conditions that will exist during an evacuation of the Shoreham EPZ, they reasoned that if the deaf were notified within 4 hours of the order to evacuate then notification would be timely. Id. at 17-18. LILCO witnesses presented evidence that there were sufficient numbers of route alert drivers to notify the deaf within 4 hours. See id. at 18-19. Suffolk County witnesses merely expressed a general concern that this notification would be untimely. See Harris and Mayer, ff. Tr. 9574, at 21-22. The Board concludes that there is reasonable assurance that a sufficient number of route alert drivers will be available to notify the deaf in a timely manner.

XII. SCHOOLS (24.E, 24.F.1,
24.F.3, 24.F.4, 24.M, 61, 68, 69, 70, 71)

A. Letters of Agreement with Schools (24.E)

594. Contention 24.E asserts that LILCO has no agreements with the schools that the schools will implement protective measures and no agreements with nursery schools or parents to permit LILCO employees to drive buses to evacuate the children.

114/ See also Findings 332-33

595. The contention is correct that LILCO has not secured such agreements. Tr. 9170 (Weismantle). However, FEMA does not require agreements with schools. Tr. 12,214 (McIntire). The guideline for Contention 24.E is NUREG-0654 II.A.3; it addresses "support organizations," which does not apply to schools.

596. The LILCO Plan is consistent with Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), LBP-81-59, 14 NRC 1211 (1981):

In regard to the absence of letters of agreement with school superintendents of [sic] school boards, it was the testimony of the FEMA witness that such letters are unnecessary since FEMA is "essentially seeking a school district plan" which would be superior to letters of agreement. . . . Further, FEMA does not believe that specific letters of agreement are needed if the service or organization providing the service is a normal portion of government and that the services are the normal resources of that given organization.

Id. at 1639 (emphasis added; citation omitted). School districts in New York State are required to file emergency disaster plans and update them annually.^{115/} Cordaro et al., Tr. 5/30/84 Vol. II, at 28; Tr. 9228 (Robinson), 9231-33, 9420 (Cordaro), 12,196, 12,754 (McIntire, Kowieski), 11,044 (Muto). LILCO has obtained copies of emergency disaster plans for most of the schools in the 10-mile EPZ^{116/} and has met with the school districts to discuss the

^{115/} Pennsylvania Power & Light Co. (Susquehanna Steam Electric Station, Units 1 & 2), LBP-82-30, 15 NRC 771, 782 (1982) (II.A.3 "would appear to apply to the school plans in question"), sua sponte review completed, ALAB-702, 16 NRC 1530 (1982), is distinguishable. There the Board concluded that, for the plan in question, written school plans were a "necessity." Id. at 798. There being no state requirement for such plans and no specific NRC guideline either, id. at 782, the Board suggested that II.A.3 might serve. In New York, on the other hand, there is a state requirement for school plans and thus no need to stretch II.A.3 to fit.

^{116/} There are 17 school districts either with schools in the EPZ or with students who live in the EPZ. At the time of hearing LILCO had received

updating of individual district plans. These plans provide adequate assurance that schools will implement whatever protective actions might be required in the event of an emergency at Shoreham.

597. As for parents, it is clear that agreements with individuals are not required. Tr. 12,433 (Keller).

B. Agreements for School Buses (24.F.1, 24.F.3)

598. Contention 24.F says that there will not be available enough buses to evacuate people without transportation of their own, homebound people, people in special facilities, and children in schools and nursery schools because (1) LILCO has no agreements under which such buses will be available, (2) most buses under contract to school districts or others, (3) most buses would be required by schools, (4) many buses have capacities less than 40 passengers, and (5) LILCO does not itself own enough buses.

599. LILCO has 1236 buses under contract with 12 bus companies. Cordaro et al., Tr. 5/30/84 Vol. II, at 57; Cordaro et al., ff. Tr. 6457, at 6-7, Att. 1-12. The bus companies have not contracted their entire fleets. Tr. 9311 (Weismantle). About 938 of these are subject to prior commitments to schools, fewer than half of which are in the EPZ. Cordaro et al., Tr. 5/30/84 Vol II, at 58; Tr. 9307 (Weismantle). Assuming an evacuation of the entire ten-mile EPZ during school hours and the unavailability of the buses with prior commitments to schools, there remain 298 buses available almost immediately to transport people out of the EPZ. Cordaro et al., Tr. 5/30/84 Vol. II, at 58; Tr. 9308 (Weismantle).

(footnote continued)

copies of emergency school plans from ten of these districts plus BOCES I and II. Cordaro et al., Tr. 5/30/84 Vol. II, at 12, 39.

600. The buses contracted to LERO can hold 49,440 adults or 74,160 children. LILCO estimates that an additional 12 people (children or adults) per bus can be transported standing in the aisle. This is sufficient to complete an evacuation in accordance with the LILCO Transition Plan. Cordaro et al., Tr. 5/30/84 Vol. II, at 7; see also Tr. 6419-20 (Robinson), 12,868 (Keller).

C. Agreements with School Bus Drivers (24.M)

601. Contention 24.M says that LILCO has no agreements with school bus drivers to implement early school dismissals or evacuation of schoolchildren to reception centers. The contention is correct that LILCO does not have written agreements with individual school bus drivers. However, such individual agreements are not required. Tr. 12,432-33 (Keller); Philadelphia Elec. Co. (Limerick Generating Station, Units 1 & 2), LBP-84-18, 19 NRC 1020, 1054 (1984).^{117/} Despite a "diligent search," LILCO has not found any precedent for requiring agreements with individuals who drive buses. Tr. 9246-47 (Cordaro, Robinson), 9446-47 (Robinson). Getting signed commitments with individuals is being studied at Indian Point, Tr. 2158 (McIntire), but it is not a requirement.

602. LILCO relies on the fact that school districts in New York must by law, and do in fact, have early dismissal plans that require the availability of buses and drivers. Under the contracts between Middle Island School District and the bus companies, for example, the bus companies are obligated to come at the District's call to pick up children early, Tr. 3115 (Muto), and

^{117/} See also Louisiana Power & Light Co. (Waterford Steam Elec. Station, Unit 3), LBP-82-112, 16 NRC 1901, 1903 (1982).

they have always met this obligation in the superintendent's experience, Tr. 3116 (Muto). In addition, LILCO has offered to provide training and dosimeters to the drivers. Cordaro et al., Tr. 5/30/84 Vol. II, at 60.

D. Sheltering in Schools (61)

603. Contention 61 alleges that the option of sheltering pupils in the schools is not workable, for essentially four reasons: (1) the schools have done no preplanning, (2) some schools have no basements or other suitable areas for sheltering, (3) there is no information about sheltering capacities or shielding factors for schools in the Plan, and (4) the Plan states that LILCO will not change an early dismissal recommendation even if a sheltering or evacuation recommendation is made for the general public, so that once early dismissal was begun, schoolchildren would not have access to shelter for hours.

604. Contrary to the contention, a good deal of preplanning has been done, much of it by LILCO. Tr. 9241 (Weismantle). First, LILCO has prepared a set of generic sheltering guidelines and submitted these to the schools. Second, LILCO has offered to have a health physicist survey each school in the EPZ and make recommendations as to the best places for sheltering in each school. A number of these surveys have already been done. Tr. 9220-23, 9436 (Miele). Third, the Company has agreed to provide manpower and other resources to help relieve some of the schools' planning burden. Cordaro et al., Tr. 5/30/84 Vol. II, at 29, 50, 78.

605. Moreover, noted above, it is a requirement of New York State law that school districts plan for emergencies, including radiological emergencies. Some of the existing early dismissal plans expressly provide for sheltering;

some even address sheltering from nuclear attacks. Cordaro et al., Tr. 5/30/84 Vol. II, at 89, Att. 23, 26.A, 29, 32, 33, 34.

606. If there is no preplanning by school officials, the LILCO Plan cannot be carried out as effectively as it might otherwise be. Tr. 9244-45 (Weismantle). But it can be carried out. Cordaro et al., Tr. 5/30/84 Vol. II, at 43-44; Tr. 9280-81 (Weismantle), 9281 (Miele). The generic guidelines could be conveyed to the schools at the time of an emergency and sheltering implemented ad hoc if necessary. Tr. 9439 (Miele); Cordaro et al., Tr. 5/30/84 Vol. II, at 50.

607. As for the allegation that the plan contains no information about sheltering capacities or shielding factors, Tr. 9279 (Weismantle), such details are not required to be in an emergency plan. See Tr. 9219 (Weismantle). For those schools for which LILCO has been permitted to do a survey, substantial evidence is available as to the best places to shelter. See, e.g., Tr. 9283 (Miele). More generally, it can be said that for most schools, being institutional buildings, the sheltering factor is as great as or better than the typical home, where presumably the students would be sheltered if they were not at school when a sheltering recommendation was given. Tr. 9276, 9281, 9306, 9438 (Miele).

608. Finally, the allegation that LILCO would not change a recommendation to schools for early dismissal, once given, is based on a mistake in the Plan, which will be corrected. Tr. 9273-74 (Weismantle). In any event, since the school districts have been provided with tone alert radios that are tuned to the EBS station, the schools will receive any recommendation to the public at precisely the same time it is made to the public. Tr. 11,020 (Muto).

E. Basis for Continued Early
Dismissal in Worsening Emergency (68)

609. Contention 68 says that the LILCO Plan fails to specify the bases upon which LILCO would continue to make a protective action recommendation of early dismissal even if sheltering or evacuation had been recommended for the general public. As noted above, this contention is based on an error in the Plan.

610. In any event, the basis for making a recommendation of early dismissal is clear, Tr. 12,736 (Baldwin): it is the occurrence of an emergency at the "Alert" stage or higher, with no protective action recommendations being made for the public. Likewise, the bases for recommending sheltering or evacuation are clearly stated in the Plan. See Cordaro *et al.*, Tr. 5/30/84 Vol. II, at 13, Att. 42. The problems that might be encountered if a recommendation were changed in midcourse are addressed below under Contention 69.E.

F. Problems with Early Dismissal (69)

611. Contention 69 alleges that the option of early dismissal is not workable for a variety of reasons:

1. The individual early dismissal plans are not included in the LILCO plan,
2. Early dismissal takes hours to implement
 - a. This will be worse due to congested road conditions and role conflict experienced by bus drivers and other personnel in authority
 - b. Students who must walk home may take a long time
 - c. Early dismissal traffic will encounter early evacuation and mobilization traffic

3. Children whose parents are not home during the day may be sent home to empty houses
4. The plan does not deal with the situation which protective action of sheltering or evacuation is made after early dismissal has already begun.

612. The first thing to be said is that the purpose of the early dismissal option, which is to reunite schoolchildren with their families whenever possible, is endorsed by just about everyone. See, e.g., Tr. 12,207-08 (Baldwin), 11,010 (Muto), 11,063 (Jeffers); Cordaro et al., Tr. 5/30/84 Vol. II, at 35-38.

Details of Early Dismissal Plans (69.B)

613. Contention 69.B says that the local plan does not provide "essential details" of early dismissal plans for the schools. Without such details, the contention says, it is impossible to tell whether such plans exist and whether they are compatible with the LILCO plan. The short answer to this is that there is no requirement that emergency plans for each individual school or school district be incorporated into a radiological emergency plan. Indeed, NUREG-0654 expressly says that a plan "should be kept as concise as possible." NUREG-0654 at 29, cited in Zimmer, supra, 15 NRC at 1575; see also Tr. 9317 (Weismantle).

614. In any event, it is clear that all schools in the EPZ have early dismissal plans, which they use for emergencies such as heavy snowstorms. Tr. 925f (Weismantle, Robinson), 12,740-41 (Keller, McIntire). These plans could be used "as is," though that would not be the best course. Tr. 9487 (Cordaro), 9269 (Weismantle). LILCO attached to its testimony the current versions of the early dismissal plans that it had received from the school districts themselves. These plans may change from time to time, but the Board

does not foresee any serious problems with "compatibility" with the LILCO Plan, since the Plan simply calls for the schools to implement their ordinary early dismissal plans. For one district, at least, this means simply moving the normal dismissal procedures to an earlier hour. Tr. 3113 (Muto).

Time Required for Early Dismissal (69.C)

615. Contention 69.C alleges that early dismissal will take a long time. It alleges that the early dismissal process takes a long time ordinarily, and that in a radiological emergency "congested road conditions" and "role conflict experienced by bus drivers and other personnel in authority" will make the problem worse. The contention alleges that "large numbers" of schoolchildren will have to walk home, distances up to two or three miles, which will take a long time. The contention alleges that children going home in an early dismissal would encounter early evacuation and mobilization traffic.

616. As for the point that early dismissal takes a long time even without a radiological emergency, the County's witnesses based their opinions principally on experience with snow emergencies, when travel conditions are very bad, Tr. 11,094-95 (Rossi), on their ideas, which are contrary to the evidence in this proceeding, about what would happen in a radiological emergency, Tr. 11,108 (Rossi), and on numerous practical problems they can foresee, Tr. 11,096-98 (Petrilak). On the other hand, they also testified that the early dismissal plans are the quickest way to get the children home. Tr. 3113-14 (Muto); Tr. 3107 (Smith); Tr. 3161 (Jeffers). The County's evidence emphasized that there are many practical problems attendant on any unscheduled dismissal, especially in a snowstorm, and the Board does not doubt that this is so. See Tr. 11,027 (Smith), 11,028 (Muto). But most of

these problems, difficult though they may be, are of the sort that are typically encountered in all kinds of emergencies. NRC regulations do not require that all problems be eliminated, only that there be an adequate plan for dealing with them. There is such a plan here.

617. Much of the County witnesses' concern was based on their view that they would be short of personnel in an emergency. See, e.g., "Role conflict" of bus drivers and other school personnel in authority is addressed above. See Findings 43-78.

618. Contention 69.C goes on to allege that it will take a long time for some children to walk home, as much as three miles away. Tr. 9457-58 (Weismantle). But the number of children who must walk appears to be small. Tr. 9435 (Lieberman), 9434 (Weismantle), 9264-65 (Robinson). It is hard to imagine any able-bodied child taking longer than an hour to walk three miles in an emergency. Cordaro et al., Tr. 5/30/84 Vol. II, at 41; Tr. 9457-58 (Weismantle). Moreover, while New York State regulations allow elementary students to walk two miles and secondary students to walk three miles, most districts bus elementary school students who live more than one-half mile away, intermediate level students more than one mile away, and high school students over one and a half miles away. In many of the districts, virtually all of the students are eligible for bus transportation. Cordaro et al., Tr. 5/30/84 Vol. II, at 40-41; see Tr. 11,037 (Rossi).

619. As for the children being delayed by early "evacuation and mobilization traffic," LILCO testified that such traffic will have little or no effect on the time needed to complete an early dismissal. Cordaro et al., Tr. 5/30/84 Vol. II, at 41. The schools will be alerted before protective actions

have been recommended for the public and before many of the public will be aware of the emergency. Cordaro et al., Tr. 5/30/84 Vol. II, at 41; Tr. 9448 (Cordaro), 12,743 (Keller). Moreover, even if early dismissal were to occur simultaneously with early evacuation and mobilization travel, the effect on the time needed to complete early dismissal would not be significant, since a large percentage of the buses' travel will be on residential streets that will not be heavily traveled by early evacuation or mobilization traffic. Cordaro et al., Tr. 5/30/84 Vol. II, at 42; see also Cordaro et al. (Contention 65), ff. Tr. 2337, at 91. Finally, Mr. Lieberman's analysis, introduced as Attachment 10 to LILCO's testimony on Contention 65, demonstrates that even under an exceedingly fast accident scenario, an early dismissal can be completed in a sufficiently expeditious manner to have only a minor effect on the time families depart their households and no effect on the time the last car departs the EPZ. Cordaro et al., Tr. 5/30/84 Vol. II, at 43; see also Cordaro et al. (Contention 65), ff. Tr. 2337, at 88-90.

Latchkey Children (69.D)

620. Contention 69.D addresses children whose parents are away from home during the day, raising the potential that they might have to return to an empty house in the event of an early dismissal. Some schools' early dismissal plans make specific provision for this possibility^{118/} by requiring parents to fill out an early school closing questionnaire indicating a responsible

^{118/} Reportedly New York State witnesses testified in the Indian Point proceeding that under New York State education law families are supposed to file instructions with school districts in the event parents are not home for an early release. Consolidated Edison Co. (Indian Point, Unit No. 2), LBP-83-68, 18 NRC 811, 983-84 (1983). No New York State witnesses testified on this issue in this proceeding.

adult neighbor who has agreed to take charge of the child in the event of a parent's absence from home. Cordaro et al., Tr. 5/30/84 Vol. II, at 44; Tr. 9270 (Weismantle), 3144-45 (Jeffers). This problem exists in any early dismissal, including those for snow emergencies, and the schools have developed procedures to deal with it. Tr. 3115 (Muto). In the Shoreham-Wading River District only a very few children have had to be kept at school during snow emergencies in the past because their parents were not home. Tr. 9531-32, 9566 (Doremus).^{119/}

621. Moreover, Mr. Lieberman testified that his analysis shows that very few children would have to wait very long in an empty house. Assuming that their parents would travel home to meet them before, for example, evacuating, only about 0.9 percent of the children will come to an empty home; for these children, the waiting time before an adult shows up, assuming the adult is commuting home from work, is approximately 15 minutes for 82 percent of the children, and for about 98 percent the wait is no more than thirty minutes. Tr. 9271-72, 9459-60 (Lieberman).

622. The contention alleges that the Plan does not provide for prior notification of parents if early dismissal is going to occur. But the early dismissal would be announced on the EBS radio stations, Tr. 1963 (Weismantle), and the schools have already developed procedures for notifying responsible adults in many cases. In early dismissals for snow, the schools have been able to inform the parents by calling systems and radio broadcasts. Tr. 3107-08 (Smith).

^{119/} The County's witnesses did not know how many children in their districts had gone home to empty houses in snow emergencies. Tr. 11,029 (Petrilak).

Escalating Emergency (69.E)

623. Contention 69.E deals with the problem of an escalating emergency, causing a change in the protective action recommendation during the course of an early dismissal. The contention first repeats the allegation of Contention 61 that LILCO does not plan to inform the schools of subsequent sheltering or evacuation protective action recommendations. But, as already noted, this is a mistake in the LILCO Plan that will be corrected.

624. The contention goes on to say that schoolchildren may be stranded in the schools or en route to their homes (walking or on buses), without available shelter, means of evacuation, or other protection and thus may be exposed to the radioactive plume as it passes. However, the students still at school could shelter there. Cordaro et al., Tr. 5/30/84 Vol. II, at 45. If students were on the way home when it was announced that sheltering or evacuation was recommended, they would continue home and take protective actions with their families. Id.; see Tr. 12,737 (Baldwin). In effect, they would be treated as members of the public, Tr. 9448 (Miele), who likewise might be in vehicles or outside on foot. The same sort of thing could happen if students were caught in a severe blizzard when sent home due to a snow alert. The risk is very small, however, because emergency classifications are based on potential conditions: if an emergency is classified as an Alert or Site Area, it is because releases are not expected to exceed EPA protective action guidelines, and so in all likelihood a recommendation to shelter or evacuate would be made before a radioactive plume actually reached the public. Cordaro et al., Tr. 5/30/84 Vol. II, at 45; Tr. 9448 (Cordaro). Finally, some school buses have two-way radios, and the number is expected to increase. Tr. 9393-94 (Robinson, Weismantle).

G. Evacuation:
Lack of Planning and Details (70)

625. Contention 70 addresses the plan to evacuate children directly from the schools to reception centers when evacuation is recommended for the general public. The contention alleges that relocation centers are not yet identified, that the LILCO Plan does not provide details of the safe reuniting of children and their families, and that school officials have not conducted "preplanning" for a Shoreham emergency.

626. There is no NRC requirement that all schools in the EPZ be able to evacuate their students directly; the EPZ is a "planning" zone, not an evacuation zone. Indeed, a draft plan prepared by Suffolk County planners, but later disclaimed by Suffolk County, provided only for early dismissal for most schools. Cordaro et al., Tr. 5/30/84 Vol. II, at 17-18. The County's contentions must be seen against this background.

627. It is true that at the time of hearing reception centers for schoolchildren had not been identified. There is no NUREG-0654 guideline for designation of special reception centers for schoolchildren. Tr. 12,750 (Kowieski). However, LILCO committed to find reception centers for each school in the EPZ, to advise the schools of the choice, and to make available maps showing the recommended best bus route between each school and its designation reception center. Cordaro et al., Tr. 5/30/84 Vol. II, at 53-54; Tr. 9286-88 (Weismantle). At the worst, LILCO might have to go as far as Nassau County to find reception centers. Tr. 9288 (Weismantle). The information about the designated reception centers will be distributed annually to households within the school districts in question. Cordaro et al., Tr. 5/30/84 Vol. II, at 54.

628. It is not necessary that the Plan contain detailed procedures for the "safe reuniting" of families with their children at the school reception centers. There is no such guideline in NUREG-0654. Tr. 12,751 (Kowieski). It is sufficient that LILCO will identify reception centers and notify parents of their location.

629. As for the allegation that the schools have not done "preplanning" for evacuation, LILCO testified at some length about the planning process that has gone on and is still continuing. See, e.g., Tr. 9204 (Weismantle), 9224 (Lieberman), 9207 (Robinson). It is true, however, that some schools are refusing to plan. One reason appears to be limited resources and a reluctance to use them planning for a plant that in the school officials' view may never operate. Tr. 9239-40 (Weismantle), 9498, 9528-29 (Doremus), 9214-16 (Cordaro). To address this problem LILCO has offered its own resources to help the schools plan. Cordaro et al., ff. Tr. 9367, at 26.

630. Another reason for the incompleteness of current planning, however, is school board policy in some districts. The Board finds that, especially if it becomes apparent that Shoreham will operate, much of the present resistance to planning will go away. Tr. 9214-15 (Robinson, Cordaro), 9238-39, 9327 (Weismantle), 9327 (Cordaro). There is strong incentive for the schools to plan; there is no dispute that school officials are motivated by a desire to protect their students' health and safety, Tr. 9238-39 (Weismantle), 12,212 (McIntire), 11,041 (Muto), and no dispute that, if a nuclear plant operates, people are safer with emergency plans than without. Much of the process of evacuation is the same as the process for early dismissal, which

the schools have planned for. There is nothing particularly difficult about transporting students outside the EPZ. Tr. 12,725 (Keller); see also Tr. 3120 (Muto). It is sufficient that there appears to be no barrier to completing the process of planning that cannot feasibly be removed.

H. Evacuation: Various Problems (71)

631. Contention 71 alleges that evacuation of nursery school children and other schoolchildren would not work for a variety of reasons involving availability of buses and bus drivers, supervision of the children, mobilization and evacuation traffic, and the need for multiple bus runs.

632. The contention first alleges that the school buses needed for evacuation would be in the custody of the normal school bus drivers or would be located substantial distances away. LILCO presented evidence as to where the school buses are stored for each school district in question, and the County and State presented no evidence. Most buses are garaged at the bus companies' yards when not in use. Tr. 6605-06 (Robinson). In any event, the regular school buses relied on for snow emergencies would be relied on here, and presumably the school districts are content with the location of the school buses for the purpose of snow emergencies, Cordaro et al., Tr. 5/30/84 Vol. II, at 61-62. The schools have worked out means for notifying their bus drivers during the day in the event of snow emergencies. id. at 54.

633. The contention next alleges (71.A.2) that the LILCO Plan has no provision for supervising children at schools, on buses, or at relocation centers. For early dismissal in a snow emergency, supervision on the bus is ordinarily provided only by the drivers; teachers or other supervisory

personnel are not expected to accompany the children. Tr. 3114 (Muto). If the relocation centers ultimately chosen are themselves schools, then it is reasonable to presume that there will be personnel there who can supervise the incoming evacuees until their parents pick them up. Cordaro et al., Tr. 5/30/84 Vol. II, at 62. In any event, if supervision is a concern for any of the schools in question, we see no reason why they cannot ask for volunteers from among the teachers to accompany the children.^{120/} See Doremus, ff. Tr. 9491, at 8. We do not regard this as an insurmountable difficulty, but rather another problem to be solved, if the schools wish to solve it, by planning.

634. Contention 71.B alleges that an evacuation would take too long, first, because the evacuating buses would encounter congestion from other mobilization and evacuation traffic. LILCO testified that during an accident which has developed rapidly to a General Emergency in which evacuation has been recommended, school bus transportation would probably be affected by the evacuation traffic. Because some schools may require buses to make more than one run, the delay in evacuation of children may be extensive. LILCO testified that this would not endanger the children because they would be sheltered in the school buildings, which offer good shielding, while waiting for the return of the buses. Cordaro et al., Tr. 5/30/84 Vol. II, at 63.

635. Contention 71.B.2 alleges that normal school dismissals require substantial numbers of multiple bus runs as well as staggered dismissal times,

^{120/} Although asking people what they think they would do in an emergency is not a reliable predictor of actual behavior, this does not mean that asking people to volunteer in advance is not a useful way to ensure that roles are clearly defined and understood.

and that an evacuation would therefore take a long time, because an even larger number of multiple bus runs requiring several hours would be necessary.

636. Mr. Lieberman calculates that about 422 bus trips would be necessary to evacuate public and parochial school students from the entire EPZ. Cordaro *et al.*, Tr. 5/30/84 Vol. II, at 55. The school districts own their own buses or have contracts with bus companies to provide them. Tr. 9446 (Weismantle). Approximately 350 school buses plus 35 coaches (carriers) are available to the 11 districts with schools in the EPZ, with only minimal sharing. Tr. 9458, 9485-86 (Weismantle). This does not include other school districts that have students who live in the EPZ; for example, Middle Country District has about 91 buses available. Tr. 9458 (Weismantle).

637. Either using multiple bus runs or supplying additional buses to the schools from the 1236 contracted to LILCO could be used to evacuate schoolchildren. Cordaro *et al.*, Tr. 5/30/84 Vol. II, at 57; Tr. 9298-99 (Weismantle). It is also likely that school districts with no schools in the EPZ would release some of their buses to help evacuate schools in the EPZ. Doremus, *ff.* Tr. 9491, at 26; Tr. 9309-10 (Weismantle). Also, LERO-contracted buses could evacuate the schools and then help evacuate the general public. Tr. 9301-02 (Weismantle); *see also* Tr. 12,227 (Kowieski).

638. There is no reason why school children have to be evacuated in a single bus run.^{121/} According to Mr. Lieberman's analysis, using the

^{121/} See Cincinnati Gas & Elec. Co. (Wm. H. Zimmer Nuclear Power Station, Unit No. 1), ALAB-727, 17 NRC 760, 772 (1983) (licensing board did not appear to be suggesting a rigid requirement that simultaneous evacuation of schools must be undertaken).

scenario in Attachment 41 to his testimony, two waves would be possible for all school districts and for several schools a third wave would be possible and still evacuate the children in the same time frame as the general public. Tr. 9461-62 (Lieberman).

XIII. INGESTION PATHWAY

A. 50-mile EPZ (81)

639. Suffolk County alleges that LILCO's Plan does not provide adequate planning and procedures for the 50-mile ingestion pathway EPZ and thus does not comply with 10 C.F.R. § 50.47 and NUREG-0654 II.J.11.

640. Under OPIP 3.6.6 the Director of Local Response has the overall responsibility for making protective action decisions concerning the ingestion pathway. The Radiation Health Coordinator is responsible for coordinating sampling and assessment activities. OPIP 3.6.6 provides that samples of milk, water, and foodstuffs will be collected by personnel implementing the Environmental Survey Function at predesignated sampling locations. These samples will then be subjected to laboratory analysis. Cordaro et al., ff. Tr. 13,563, at 34-35, Att. 1.

641. OPIP 3.6.6 delineates specific preventive and emergency protective action guidelines, established by the Food and Drug Administration, for the treatment and disposition of milk, water, fruit, vegetables, and other foodstuffs. These protective action guidelines designate specific activities of various radionuclides in milk, water, and other foods that may have adverse health consequences and provide the threshold for issuing specific preventive or emergency protective action recommendations. Cordaro et al., ff. Tr.

13,563, at 18-19, Att. 1; Baldwin et al., ff. Tr. 12,174, at 86-87.^{122/}

642. The Director of Local Response will communicate protective action recommendations directly to the New York State Commissioner of Health as well as to the Chief of the Radiation Control Unit of the Connecticut Department of Environmental Protection. If New York State officials fail to assume responsibility for the ingestion exposure pathway, LERO will undertake to implement appropriate protective actions as set forth in OPIP 3.6.6. Cordaro et al., ff. Tr. 13,563, at 37, Att. 1; Baldwin et al., ff. Tr. 12,174, at 89; Tr. 14,251, 14,289 (Keller).

643. LERO will communicate recommended protective actions to farmers, food processors, and other food-chain establishments by telephone and EBS bulletins. OPIP 3.6.6 includes extensive and up-to-date listings of the names, addresses, and (where available) telephone numbers of dairy farms, poultry farms, hog farms, vegetable and fruit growers, and farmstands located within the New York segment of the 50-mile EPZ as well as food and dairy processors using agricultural commodities produced within the 50-mile EPZ. The Coordinator of Public Information is responsible for communicating appropriate protective action recommendations to the general public by EBS bulletin. Cordaro et al., ff. Tr. 13,563, at 10, 23-24, 37-38, Att. 1-6; Tr. 13,584-85, 13,649-51 (Daverio).

^{122/} It is extremely unlikely that "long-lived" radioisotopes would be released in the event of an accident at Shoreham. Nonetheless, Attachments 1-5 of OPIP 3.6.6 include preventive and emergency Protective Action Guides for milk, water, and foodstuffs that have been exposed to cesium-134, cesium-137, strontium-89, and strontium-90. In the unlikely event that a sample were found to have an unacceptably high concentration of any of these radioisotopes, LILCO would undertake to purchase the contaminated food and dispose of it in accordance with Sections 5.4 and 5.5 of OPIP 3.6.6. Cordaro et al., ff. Tr. 13,563, at 19, Att. 1; Tr. 13,591-93 (Watts).

644. LILCO's Plan embodies a liberal policy of compensating food-chain establishments for losses sustained by reason of a radiological emergency. LILCO will fully compensate any farmer, processor, vendor, commercial fishery, or other food-chain establishment for food that has been rendered unsalvageable as a result of the radiological emergency. Cordaro et al., ff. Tr. 13,563, at 14, 20, 24-25, 31-33, Att.1; Tr. 13,634 (Watts), 13,636 (Cordaro), 13,679-87 (Cordaro, Daverio, Watts), 13,690-91 (Daverio). This compensation policy extends to the radioactive contamination of food, the spoilage of uncontaminated food withheld from the marketplace, and incidental economic losses. Tr. 13,619 (Cordaro, Daverio). Both FEMA and LILCO witnesses testified that this policy will effectively eliminate any incentive for the farmer or merchant to sell or distribute contaminated food to anyone other than LILCO. Tr. 13,687-88, 13,729 (Cordaro), 14,252, 14,257-58 (Keller, McIntire).

645. The Plan includes specific procedures to minimize or prevent contamination. If a General Emergency is declared, LERO will immediately contact dairy farmers located within a 10-mile radius of Shoreham. Farmers will be instructed to remove dairy animals from pasture and place them on stored feed until further notice. By taking these immediate precautionary measures, the possibility of milk contamination is minimized. Cordaro et al., ff. Tr. 13,563, at 11; Tr. 13,568-72 (Daverio, Watts).^{123/}

^{123/} It is extremely unlikely that any dairy farmer in the 50-mile EPZ will not have some quantity of stored feed at all times. Stored feed and vitamins account for a substantial, if not the predominant, share of the diet of dairy animals in the region. Because of the relatively severe winters in New York State, local dairy farmers typically maintain a substantial supply of stored

646. In the event of a radiological release, LERO will dispatch environmental survey teams to collect samples of milk, fodder, and forage from dairy farms located in the area of potential contamination. Laboratory analysis of these samples will be coordinated by personnel implementing the Dose Assessment Function under the supervision of the Radiological Health Coordinator. Cordaro et al., ff. Tr. 13,563, at 12; Tr. 13,598-601 (Porter, Watts).

647. LERO will compare the laboratory test results for the milk samples with the Protective Action Guides that are set forth in Attachments 1-3 of OPIP 3.6.6. If the projected or measured activity of a particular radionuclide in a sample is found to exceed the applicable preventive response level, LERO will initiate further protective actions. Potentially affected farmers will be instructed to keep all dairy animals indoors and to provide them with uncontaminated food and water, i.e., feed and water from covered sources. Farmers will also be advised to withhold their milk from commerce, store it at reduced temperatures, and take a representative one-gallon sample from each milking. These samples will be picked up by environmental survey teams for laboratory analysis. Cordaro et al., ff. Tr. 13,563, at 12-13, Att. 1; Tr. 13,608-13 (Cordaro, Daverio, Porter, Watts).^{124/}

(footnote continued)

feed. Local climatic conditions, moreover, necessitate that such feed be kept in a shelter. Stored feed is thus protected from contamination resulting from airborne radioactive particulates. Cordaro et al., ff. Tr. 13,563, at 15; Tr. 13,620-22 (Porter, Watts).

^{124/} Since OPIP 3.6.6 provides for removing dairy animals from pasture immediately and restricting their intake to stored feed and water from a covered

(footnote continued)

648. The Plan contains additional safeguards for preventing public consumption of contaminated milk. OPIP 3.6.6 calls for environmental survey teams to sample milk at processing plants as well as from tank trucks. If the projected or measured activity of a radionuclide in a sample is found to exceed the applicable FDA preventive response level, the affected dairy processor will be contacted by telephone. The processor will be advised to withhold contaminated milk from commerce to allow for the radioactive decay of a particular radionuclide. To this end, the processor may be advised to freeze and store contaminated milk for a specified period of time. Alternatively, the processor may be advised to divert fluid milk to the production of dry whole milk, nonfat dry milk, butter, cheese, or evaporated milk. Furthermore, the processor will be instructed to store all incoming shipments in separate tanks and to take representative one-gallon samples from each such shipment for monitoring purposes. Cordaro et al., ff. Tr. 13,563, at 13-14, Att. 1; Tr. 13,616-19 (Daverio and Watts); Tr. 13,714-20 (Cordaro, Porter, Watts).

649. If the radioactivity contamination of locally produced grains, fruits, and vegetables exceeds the applicable preventive protective action guide, LILCO's policy is to buy all such produce from farmers, vendors, and

(footnote continued)

source, it is unlikely that dairy animals would receive internal contamination in the event of a radiological emergency. Even assuming that a lactating dairy animal does receive some internal contamination, this will not pose a potential public health problem except insofar as milk is concerned. There is no commercial beef production in the New York State portion of the 50-mile EPZ. To the extent that dairy animals receive external contamination, moreover, such contamination may be removed simply by washing and scrubbing the animal. Accordingly, there is no need for the Plan to include specific procedures governing the disposition of lactating dairy animals. Cordaro et al., ff. Tr. 13,563, at 16-17; Tr. 13,626-32 (Cordaro, Porter, Watts).

other food-chain establishments. In certain circumstances, however, LERO may instruct the public, by EBS bulletin, to wash, brush, scrub, or peel certain types of locally grown fruits and vegetables that were purchased or harvested after a radiological incident. Cordaro *et al.*, ff. Tr. 13,563, at 20-23, Att. 1; Tr. 13,636, 13,639-40, 13,646-47 (Cordaro, Watts). This recommendation will apply only if the food may be consumed safely by the public; that is, the level of radioactivity is below the applicable preventive protection action guide. Tr. 13,640-43 (Watts).^{125/}

650. In the event of a radiological emergency, environmental survey teams will be dispatched to collect representative samples of fruits and vegetables from farmstands located in the affected area. If these samples are found to have an unacceptably high level of radioactive contamination, LERO will contact, by telephone or EBS bulletin, farmstand operators in the affected area. Farmstand operators will be advised to withhold their produce from the market until further notice. In addition, they will be instructed to wash, brush, or scrub uncovered produce and advised of LILCO's policy to compensate them fully for unsalvageable produce. These procedures will effectively minimize the possibility that contaminated produce will be available for sale to

^{125/} Normal washing, brushing, and scrubbing will remove radioactive contamination from the surfaces of fruits and vegetables, just as such measures remove surface contamination caused by non-radioactive substances. Thus, as in the case of the New York State Radiological Emergency Preparedness Plan, LILCO's Plan does not include specific procedures for removing radioactive contamination in this manner. Cordaro *et al.*, ff. Tr. 13,563, at 21. Radioactive particulates from fruits and vegetables that are washed in a sink do not pose a potential health problem because of dilution in the water purification process. By the same token, peelings and other residue may be disposed of as any other garbage is, in a trash receptacle or similar container. *Id.* at 21-22.

the public at farmstands. Cordaro et al., ff. 13,563, at 23-25, Att. 1 and 5; Tr. 13,649-52 (Daverio), 14,252, 14,257-59 (Keller, McIntire).

651. LERO maintains up-to-date maps showing key land use data, dairies, food processors, surface water intakes, reservoirs, treatment plants, and groundwater sources. In addition, LERO has a United States Geological Service hydrologic unit map which shows drainage basins within the New York portion of the 50-mile EPZ as well as a comprehensive list of New York streams that drain into river basins in that area. Cordaro et al., ff. Tr. 13,563, at 25-26. Because of their large size, these maps are not physically appended to the Plan. Tr. 13,750 (Daverio).

652. LERO maintains a comprehensive list of community wells and surface water sources that are situated in the New York segment of the 50-mile EPZ. If a radiological emergency is declared, environmental survey teams will periodically obtain water samples from reservoirs, wells, and other water sources in the area of potential contamination. If these samples are determined to have an unacceptably high level of radioactive contamination, LERO will contact the affected water supply operators and inform them. In addition, residents of affected water districts will be advised, by EBS bulletin, to limit or cease consumption of tap water until further notice. The Director of Local Response, in conjunction with the Logistic Support Coordinator and the Support Services Coordinator, will undertake to procure supplemental potable water supplies. Cordaro et al., ff. Tr. 13,563, at 26-29, Tr. 13,668-79 (Cordaro, Porter, Watts).

653. OPIP 3.6.6 includes specific procedures and criteria for developing dietary recommendations. Attachments 4 and 5 of OPIP 3.6.6 delineate

a methodology for determining appropriate protective actions for milk and other foodstuffs respectively. Among the factors to be considered is the relative importance of the particular food item in the average daily diet. Attachment 6 of OPIP 3.6.6 assigns average daily consumption values for specific food groups based on FDA Guidelines. If the measured activity of a radionuclide in a food sample exceeds the emergency response level, LERO will advise the general public, by EBS bulletin, to restrict its diet to foods other than those identified as contaminated. In such circumstances, LERO may also recommend that the public use foods in sealed packages, cartons, or cans, which are protected from radioactive contamination. Cordaro et al., ff. Tr. 13,563, at 30-32, Att. 1; Tr. 14,249 (Keller).

654. Since the normal diet of commercially raised ducks consists almost entirely of stored feed, it is highly unlikely that such ducks will receive internal contamination as a result of an atmospheric release of radioactive particulates. If a radiological accident occurs during a season when wild ducks are present on Long Island, LERO will advise the public, by EBS bulletin, not to consume wild ducks until further notice. LERO will confer with federal authorities to determine the migratory patterns of such birds, and issue appropriate advisories. Cordaro et al., ff. Tr. 13,563, at 33; Tr. 13,692-95 (Daverio, Porter, Watts).

655. In the event of a radiological emergency, the Department of Energy initially will provide dose assessment and environmental survey personnel from Brookhaven National Laboratory, which is located approximately six miles from Shoreham. DOE will provide additional personnel from remote locations, if necessary, within sufficient time to monitor the ingestion exposure

pathway. Cordaro et al., ff. Tr. 13,563, at 34-35, Att. 1; Tr. 13,702-03 (Daverio), 14,253-54 (Keller, McIntire).

656. By virtue of its membership in the Institute of Nuclear Power Operations, LILCO can draw on the resources of other member utilities in the event of a radiological emergency. Member utilities within a 300-mile radius of Shoreham can furnish approximately 60 two-man radiological survey teams equipped with survey instrumentation and vehicles. These utilities can also provide approximately 25 health physics supervisors to coordinate these teams and roughly 45 health physics/environmental engineers to coordinate sample analysis and interpret environmental data. Member utilities located beyond a 300-mile radius of Shoreham can substantially augment these resources, if necessary, within a 24-hour period. Cordaro et al., ff. Tr. 13,563, at 35-36.

657. To augment the number of field survey teams, the Radiation Health Coordinator can also call upon LILCO personnel assigned to Shoreham's Radiological Environmental Monitoring Program. More than a dozen LILCO/REMP employees are available to supplement or assist survey teams. Cordaro et al., ff. Tr. 13,563, at 36.

658. The FEMA witnesses testified that the federal government will commit substantial resources to environmental surveillance and monitoring of the ingestion exposure pathway in the event of a major radiological emergency. Tr. 14,252-54, 14,266-67 (Keller, McIntire). For example, in response to the Three Mile Island accident in March 1979, the NRC, DOE, EPA, and FDA each provided personnel and equipment to assist in offsite environmental surveillance. The Federal Radiological Emergency Response Plan and the

recent interagency exercise at the St. Lucie plant underscore the intent of the federal government to respond quickly and effectively to requests by licensees for radiological assistance. Cordaro et al., ff. Tr. 13,563, at 38-39, Att. 7; Tr. 13,704-07 (Cordaro, Daverio, Watts), 14,252-54, 14,266-67 (McIntire).

659. The Board concludes that LILCO's Plan includes adequate planning and procedures governing the 50-mile ingestion pathway EPZ and thus is in compliance with applicable NRC regulations and NUPEG-0654 II.J.11.

B. Recovery and Reentry (85, 88)

General Plans for Recovery and Reentry (85)

660. Suffolk County alleges that LILCO's Plan fails to include a general plan for recovery and reentry and does not set forth procedures for implementing recovery and reentry operations. Minor, ff. Tr. 15,384, at 2-5.

661. OPIP 3.10.1 establishes a Recovery Action Committee (Committee) and delineates its responsibilities. The Committee includes the Manager of Local Response, the Radiation Health Coordinator, and a Nuclear Engineer. The Committee has two functions: to assist the Director of Local Response in making recovery/reentry decisions and to implement recovery/reentry activities authorized by the Director of Local Response. Representatives of FEMA, DOE, EPA, and state and county governments also will be invited to participate in the Committee's deliberations. Cordaro et al. (85), ff. Tr. 15,282, at 7, Att. 1; Tr. 15,292 (Daverio).

662. The Nuclear Engineer will determine that the plant is stable. He will, for example, investigate containment isolation, core damage, coolant damage, and other matters relating to plant stability. Tr. 15,291-92,

15,321-28 (Cordaro, Daverio). Contemporaneously, the Radiation Health Coordinator will review data derived from air monitoring, environmental survey sampling, and ingestion pathway sampling. The Radiation Health Coordinator will compare these data with the dose criteria for reentry, as set forth in OPIP 3.10.1. Cordaro et al. (85), ff. Tr. 15,282, at 7-9, Att. 1; Tr. 15,301-02 (Daverio), 15,306-08 (Watts).

663. If the prerequisites set forth in Section 4.0 of OPIP 3.10.1 are satisfied, the Manager of Local Response will convene the Committee. The Committee will develop specific recommendations regarding environmental decontamination, transportation, traffic control, communications, security and other matters set forth in Section 5.2 of OPIP 3.10.1. The Manager of Local Response will convey these recommendations to the Director of Local Response, who will authorize specific recovery/reentry operations. Cordaro et al. (85), ff. Tr. 15,282, at Att. 1.

664. Under OPIP 3.10.1 the Health Services Coordinator is responsible for decontamination activities. Given the wide variety of circumstances that may exist in the course of a radiological accident, it is not possible to include comprehensive decontamination procedures in the Plan. There is, however, a plethora of publicly available technical literature on the subject of radioactive decontamination options and procedures. Cordaro et al. (85), ff. Tr. 15,282, at Att.1; Tr. 15,293-95, 15,312-14 (Daverio), 15,298-99, 15,314-15 (Watts).

665. OPIP 3.10.1 includes a general procedure governing the disposal of radioactive waste. Solid radioactive wastes, collected from decontamination activities, will be transported to Shoreham pending ultimate disposition. Liquid wastes will be discharged to the sewers only after a determination that

the isotopic activity in such waste materials is below an acceptable level.

Cordaro et al. (85), ff. Tr. 15,282, at Att. 1; Tr. 15,319-21 (Cordaro, Daverio, Watts).

666. OPIP 3.10.2 embodies a method for calculating total population dose. Under OPIP 3.10.2, hourly zone population estimates are multiplied by the whole body and thyroid doses, yielding an hourly dose for each zone. The sum of these hourly dose values, which represents the total dose for each zone, is then multiplied by the applicable dose reduction factor. The sum of these calculations constitutes the total population dose. Cordaro et al. (Supp. 85), ff. Tr. 15,282, at 3-4, Att. 1.

667. LERO will confer with federal agencies and, where possible, state and local governments to evaluate available population and dose data prior to calculating total population dose. Sources for periodic population estimates include Marketing Evaluations survey data; reports from traffic guides, evacuation route spotters, and transfer point coordinators; and estimated evacuation times from Appendix A of the Plan. Cordaro et al. (Supp. 85), ff. Tr. 15,282, at 4, Att 1; Tr. 15,346-48, 15,351-58 (Daverio, Watts).

668. The Board thus finds that the LILCO Plan sets forth a general plan for recovery and reentry, including adequate procedures for initiating and implementing a recovery/reentry operation, in compliance with applicable NRC regulations and NUREG-0654 II.M.

Dose Criteria for Reentry (88)

669. The Intervenor's contend that the Plan fails to state the dose criteria that will provide the basis for a determination that it is safe for the public to reenter previously evacuated areas and that LILCO's method of

calculating total population exposure is not adequate for determining dose rates or a projected dose in an area to be reentered. Minor, ff. Tr. 15,384, at 2, 5-6.

670. The radiological criteria that will serve as a basis for a determination that it is safe for the public to reenter previously evacuated areas are set forth in section 5.3 of OPIP 3.10.1 of Revision 4 of the Plan. Section 5.3.2.b provides that an area will be considered contaminated if "evaluation of environmental monitoring results, plant data, and/or laboratory analysis of isotopes shows that direct constant exposure and inhalation of resuspended particulates for one year (allowing for radioactive decay) will result in a dose greater than 500 mR to wholebody or equivalent to any organ." Section 5.3.2.b also provides that the applicable models for calculating dose criteria for reentry are contained in Regulatory Guide 1.109 and WASH 1400 and that the results of this calculation are to be compared with Attachment 1 of OPIP 3.6.6 for ingestion pathway considerations. Cordaro et al., ff. Tr. 15,284, at 6, Att. 2; Tr. 15,329-30, 15,361 (Daverio, Watts).

671. There are presently no NRC regulations or NUREG-0654 guidelines that address the acceptable offsite radiological levels for reentry. Cordaro et al., Tr. 15,284, at 7. LILCO's radiological criteria for reentry, however, are consistent with 10 C.F.R. § 20.105(a), the acceptable contamination levels for reentry set forth in Part I, Section IV.C of the New York State Radiological Emergency Preparedness Plan and the protective action guidelines for reentry to be issued by the Environmental Protection Agency sometime this fall. Id.; Tr. 15,363-64, 15,369-79 (Daverio, Watts).

672. Section 20.105(a) of 10 C.F.R. provides that the Nuclear Regulatory Commission will approve proposed limits on levels of radiation in unrestricted areas if the applicant demonstrates that the limits are not likely to cause any individual to receive a dose to the whole body exceeding 0.5 rem in any period of one calendar year. Cordaro et al., ff. Tr. 15,284, at 7-8, Att. 3; Tr. 15,369-75 (Watts).

673. Part I, Section IV.C of the New York State Radiological Emergency Preparedness Plan also uses 0.5 rem as the threshold contamination level for reentry. Cordaro et al., ff. Tr. 15,284, at 8, Att. 4; Tr. 15,369-72, 15,375-79 (Daverio, Watts).

674. LILCO has contacted EPA to determine the dose criteria guidelines for reentry that will appear in EPA's draft guidance due out this fall and learned that the guidelines will cover a range from 0.5 rem to 5.0 rem. Tr. 15,367-68, 15,373 (Watts).

675. Both the LILCO and FEMA witnesses testified that a calculation of total population exposure is not used for initial protective actions but, rather, is useful in assessing the potential long-term consequences of a radiological accident. Tr. 15,341-42 (Watts); 14,338, 14,579 (Keller). The LILCO witnesses testified that calculation of total population dose is a public information tool and a means that may be used in assessing the long-term health consequences, if any, of a radiological release. There is no immediate need to know the total population dose; the dose will be calculated only after due deliberations within LERO and consultation with other offsite agencies. Cordaro et al. (Supp. 85), ff. Tr. 15,284, at 4, Att. 1; Tr. 15,341-42, 15,347-48 (Daverio, Watts). To illustrate this basic principle, Mr. Watts

testified how total population dose was used following the accidents at Three Mile Island and Ginna in the manner described above. Tr. 15,341-42 (Watts).

676. The Board finds that the LILCO Plan includes dose criteria for reentry by the public into previously evacuated areas, that the dose criteria satisfy NRC regulations and NUREG-0654, guidelines and that, contrary to the Intervenor's presumption, total population exposure is not used in assessing dose criteria for reentry.

C. State Plan (92)

677. Contention 92 raises four issues regarding a New York State Emergency Plan for Shoreham: (1) whether such a plan exists; (2) whether the LILCO Plan is adequate absent a State Plan; (3) whether the State would respond during an actual emergency; and (4) whether the LILCO Plan provides for coordination of LERO and State responses should the State respond in an emergency. New York State and Suffolk County presented no evidence on this issue.

678. The Intervenor's assert in Contention 92, and LILCO agrees, that there is not a site-specific volume for Shoreham in the New York State Plan. Cordaro and Weismantle, ff. Tr. 13,899, at 4. Site-specific plans exist for every other nuclear power plant in New York State. But the LILCO Transition Plan does not rely upon a response from New York State in an emergency. Id.

679. New York State laws detailed in the "New York State Disaster Preparedness Plan" prepared by the Disaster Preparedness Commission of the State of New York (revised September 1982) describe the responsibilities of the State with regard to a radiological emergency. Id. at 4-5, Att. 10.

Under Article II.B of the State Executive Law, the State Disaster Preparedness Commission will "create, following the declaration of the State Disaster Emergency, a temporary organization in the disaster area to provide integration and cooperation of efforts among the various federal, state, municipal and private agencies involved." Id. at 5, Att. 10, at A-5. New York State personnel generally perform four functions in an emergency at a nuclear power plant in the State: (1) dose projection based upon release data communicated to State officials; (2) ingestion pathway sampling in the 50-mile EPZ; (3) interdiction of contaminated foods; and (4) making protective action recommendations if a state of emergency has been declared. Id. at 6. The LILCO Plan uses LERO for all four of these functions. Id. Thus, there are no voids created by New York State's present lack of participation in planning.

680. New York State has indicated that the State and County would respond to an emergency at Shoreham. The Governor of New York stated, in a press release dated December 20, 1983, that "of course, if the plant were to be operated and a misadventure were to occur, both the State and County would help to the extent possible; no one suggests otherwise." Id. at 7. In addition, the "New York State Disaster Preparedness Plan" prepared by the Disaster Preparedness Commission of the State of New York (September, 1982), id., Att. 10, states that "it is the policy of the State to take actions to prevent or mitigate the effects of natural or manmade disasters, to be prepared, within its resources, to respond to an emergency or disaster, and to expedite recovery." Id. at 1-3, Att. 10. According to the New York State Plan, services provided to prevent, minimize, and respond in recovery after

a disaster "will be coordinated to the maximum extent with comparable activities of local governments, other states, the federal government, and voluntary/private agencies of many types." Id. Therefore, nothing in the New York State Plan contradicts the notion that the State and County would participate in an actual emergency at Shoreham, and no testimony to the contrary was presented by New York State or Suffolk County.

681. The LILCO Plan allows for participation of both New York State and local officials during an emergency should State and County officials choose to participate in an emergency response. Id. at 8. Existing communication systems already installed within the State would be used to notify the State of an emergency whether or not the State chooses to respond. Id. at 8, Att. 12.^{126/} Space for use by State officials exists in the LILCO Emergency Operations Facility, the Emergency Operations Center, and the Emergency News Center. Id. at 8, Att. 13. The LILCO Plan provides that in making any protective action recommendations the Director of Local Response is to take into account advice that may be received from local and State government officials. Id. at 9, Att. 14. Consequently, if New York State officials should decide to participate, their involvement could easily be incorporated into the emergency response. Id. at 9.

682. Accordingly, we find that the absence of a New York State plan for Shoreham is not a deficiency in the offsite-planning process.

^{126/} If, as was suggested on the record, the State in fact has unplugged the RECS telephone, it need only plug it in to communicate in an emergency. Tr. 13,737-41 (Daverio).

D. Connecticut (24.R)

683. Contention 24.R involves two issues regarding the emergency response of the State of Connecticut in the portion of Connecticut that lies in the ingestion pathway EPZ: (1) whether Connecticut has agreed to take protective actions in the event of an emergency at Shoreham and (2) whether the letters of agreement between LILCO and Connecticut satisfy the guidelines of NUREG-0654.

684. Five letters form the basis for the response to Contention 24.R. Connecticut's first letter, dated December 15, 1983, Cordaro et al., Tr. 4/6/84 Vol. II, Att. 28, from Mr. Frank Mancuso, State Director of the Office of Civil Preparedness, provides that Connecticut, pursuant to requests for assistance from "licensees, federal, state, and local (county) agencies," would "support and provide radiological assistance in Connecticut" should an accident occur at Shoreham. Id. This letter was addressed to the State of New York, id.; its application to LILCO was challenged on cross-examination by Suffolk County. See Tr. 6366-68 (Robinson). On cross-examination of LILCO witnesses on April 24, 1984, New York State produced a letter dated March 30, 1984 from David Axelrod, Chairman of New York State Disaster Preparedness Commission, to Mr. Mancuso, disavowing any agreement to exchange information with Connecticut for Shoreham. N.Y. Ex. 3. This letter had not previously been provided to LILCO. See Tr. 6592 (Robinson). Mancuso responded in a letter dated April 18, 1984, that (1) "the State of Connecticut will not become involved in the explosive environment that exists in the State of New York concerning Radiological Emergency Planning," (2) that the December 15 letter "does not purport to serve as a letter of

agreement" between New York and Connecticut, and (3) that the December 15 letter "does suggest that [Connecticut is] meeting the requirements of NUREG-0654 FEMA REP 1." LILCO Ex. 48, at 2; Tr. 13,868-69 (Renz).

685. In light of the controversy raised by New York State's letter of March 30, LILCO asked Connecticut to reconfirm its position in writing. Cordaro and Renz, ff. Tr. 13,858, at 2-3, Att. 1; Tr. 13,860, 13,888 (Renz). Connecticut responded to LILCO in a letter dated June 14, 1984, in which Mr. Mancuso stated that Connecticut will respond to an emergency at Shoreham "by instituting existing emergency plans and resources to protect the health and safety of the residents of Connecticut." Cordaro and Renz, ff. Tr. 13,858, at Att. 2. This response will be forthcoming "[r]egardless of what New York or LILCO does," and whether Connecticut is notified "by LILCO or any other competent source." *Id.* LILCO asserts that this letter, taken with the December 15, 1983 letter, constitutes an agreement by Connecticut to take protective actions within its boundaries should an emergency occur at Shoreham. *Id.* at 3; Tr. 13,874 (Renz), 13,883-84 (Cordaro).

686. The Board concludes that the letters clearly articulate the State of Connecticut's commitment to respond in the event of an accident at Shoreham, and that these documents can be relied upon by LILCO as an agreement between Connecticut and LILCO. While the June 14, 1984 letter does not specifically state that Connecticut will "exchange information" with LILCO, Tr. 13,873, 13,874 (Renz), the clear intent in the letter is that Connecticut will comply with the guidance set forth in NUREG-0654, will work with LILCO, and will respond as appropriate to an emergency at Shoreham. Tr. 13,874, 13,880-81 (Renz), 13,868, 13,884 (Cordaro). The letters therefore constitute agreements satisfying NUREG-0654.

XIV. LOSS OF OFFSITE POWER (93-96)

687. Contentions 93-96 allege that the LILCO Plan, in certain specific respects, fails to provide for a potential loss of offsite power in conjunction with an accident at Shoreham. The preamble to the Contentions alleges that the LILCO Plan "must provide an adequate response for even 'the worst possible accident, regardless of its extremely low likelihood.' NUREG-0654, Section I.D. at 7. This includes a loss of offsite power...." We reject this premise for these Contentions. NUREG-0654 does not require an adequate response for the "worst possible accident" at Shoreham; it simply provides that the worst possible accident is taken into consideration in the planning basis for the provisions of NUREG-0654. Tr. 5581-83 (Weismantle). Moreover, the language refers to "the worst possible accident" at the plant, not the worst possible conditions that can be imagined to exist offsite, such as a loss of offsite power. Cordaro et al., ff. Tr. 5575, at 4.

688. We also reject the assertion in the preamble that a loss of offsite power "would not be unlikely in conjunction with a severe accident at Shoreham." LILCO's testimony made it clear that an accident at Shoreham itself would be highly unlikely to cause a loss of offsite power because of ample and interconnected generating capacity on the LILCO system and the New York Power Pool. Cordaro et al., ff. Tr. 5575, at 5-6. This testimony was unimpeached. While cross-examination of the LILCO panel raised some question as to the probability that a loss of offsite power might contribute to the small risk of an accident at Shoreham, see Tr. 5580 (Renz), 5657A-B (Cordaro), LILCO's unrebutted testimony was that the probability of a loss of offsite power "in conjunction with" an accident at Shoreham is extremely unlikely. Tr. 5592, 5594-95, 5653-55 (Cordaro).

A. EOC, Staging Areas, Bus Transfer Points,
Receiving Hospitals, and Relocation Centers (93)

689. Contention C argues that the LILCO Plan does not provide backup power to the EOC, staging areas, bus transfer points, receiving hospitals, or relocation centers. There is no regulatory requirement for such backup power, Cordaro et al., ff. Tr. 5575, at 8, and LILCO's testimony demonstrated that all these facilities would function adequately in the event of a loss of offsite power, e.g., id. at 8-11; Tr. 5601-02 (Renz), 5604-07 (Schiffmacher).

690. The Emergency Operations Center (EOC) has a 75 kw gas-fired emergency generator that is sufficient to provide the required power to support LERO activities. Cordaro et al., ff. Tr. 5575, at 8; Baldwin et al., ff. Tr. 12,174, at 94; Tr. 5603-07 (Schiffmacher, Weismantle).

691. The staging areas at Riverhead and Port Jefferson also have backup generators sufficient to support LERO activities. Cordaro et al., ff. Tr. 5575, at 9; Tr. 5609-10 (Schiffmacher). At Patchogue, the radio is backed up by a battery. Cordaro et al., ff. Tr. 5575, at 9; Tr. 5610-11 (Schiffmacher). At all three staging areas, flashlights and car lights will also be available. Cordaro et al., ff. Tr. 5575, at 9; Tr. 5611-13 (Renz).

692. Bus transfer points and relocation centers can function adequately without backup power. Cordaro et al., ff. Tr. 5575, at 9-11; Tr. 5601, 5613-15, 5619-20 (Renz).

693. Receiving hospitals are likely to have multiple backup power sources. Cordaro et al., ff. Tr. 5575, at 10; Tr. 5617-19 (Renz, Weismantle). There is nothing in the record to the contrary.

B. Customer Service Office and EOC (94)

694. There is no requirement for backup power supplies at the Customer Service Office or the EOC. Nonetheless, adequate backup generators are present at those places. Cordaro et al., ff. Tr. 5575, at 12-13; Baldwin et al., ff. Tr. 12,174, at 95; Tr. 5621-22, 5624-25 (Schiffmacher).

C. Sirens, Tone Alert Radios, and ENC (95)

695. The litigated portions of Contention 95, subparts A, D, and E, allege that the LILCO Transition Plan fails to provide backup power supplies to the emergency sirens, tone alert radios, and the Emergency News Center (ENC). There is, however, no requirement for backup power supplies for any of these. Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), LBP-81-59, 14 NRC 1211, 1542 (1981); Cordaro et al., ff. Tr. 5575, at 14-15, 21, 22; see also Baldwin et al., ff. Tr. 12,174, at 96-97.

696. Based on his experience as a consultant to a number of utilities and states concerning emergency planning and communications, LILCO's witness Hobbs testified that LILCO, like the majority of other utilities, uses electro-mechanical sirens and that he was not aware of any utility or government responsible for notification of the public in the vicinity of a nuclear power plant that has a direct backup power supply for such a siren system. Cordaro et al., ff. Tr. 5575, at 20. We see no reason to require more here. Indeed, other emergency plans for nuclear power plants in New York have been accepted and have no independent backup power supplies for electro-mechanical sirens such as those used by LILCO. Cordaro et al., ff. Tr. 5575, at 14-15.

697. A loss of power to the siren system is unlikely because of interconnections and the design of the LILCO grid. Cordaro et al., ff. Tr. 5575, at 15. If power were lost, LILCO has committed to restore power to the sirens on a priority basis by use of black start gas turbines, id. at 15-16, and LILCO has the means to do so, id. at 16; Tr. 5625-34 (Schiffmacher). In addition, the alerting function performed by the sirens will be backed up by route alert drivers, tone alert radios, and perhaps by helicopter notification through Island Helicopter. Cordaro et al., ff. Tr. 5575, at 17-19, Att. 2; Baldwin et al., ff. Tr. 12,174, at 96; Tr. 5638-40 (Renz); see Findings 326-28. This arrangement complies with applicable requirements. Cordaro et al., ff. Tr. 5575, at 19-20.

698. The tone alert radios are backed up by batteries. Cordaro et al., ff. Tr. 5575, at 21; Tr. 5651 (Renz).

699. A loss of offsite power would not render the ENC inoperable. Cordaro et al., ff. Tr. 5575, at 22. If necessary, the ENC would be relocated to LILCO's Mineola office. Id.; Tr. 5651-52 (Renz).

D. Loss of Power To Ambulance and Bus Companies,
Special Facilities, Residential Lighting,
Streetlights, Gas Stations, and Traffic Signals (96)

700. The County maintains that the LILCO Transition Plan is inadequate because it does not address loss of offsite power (1) to ambulance and bus companies, (2) special facilities, or (3) residential lighting, streetlights, service stations, and traffic signals.

Ambulance and Bus Companies (96.A)

701. There is no regulatory requirement for backup power supplies to either ambulance or bus companies. Cordaro et al., ff. Tr. 5717, at 6. The

LILCO witnesses testified that they are unaware of any radiological emergency plan that includes special backup power provisions for ambulance and bus companies. Id. at 7; Tr. 5723 (Robinson).

702. In addition, the facts show that these facilities will not become inoperable if offsite power is lost. All of the ambulance companies upon which LILCO rely continue to operate during power outages. Cordaro et al., ff. Tr. 5717, at 8, Att. 1. Eight of the eleven ambulance companies with which LILCO has contracts have backup power supplies. Id. at Att. 1; Tr. 5720-22 (Robinson), 5735-36 (Cordaro, Robinson). The three ambulance companies that do not have backup power communicate by means of personal pocket pagers and/or two-way radios. Cordaro et al., ff. Tr. 5717, Att. 1; Baldwin et al., ff. Tr. 12,174, at 98; Tr. 5735 (Robinson). Ambulance drivers will be instructed to call their dispatcher if they are not receiving radio communications. Cordaro et al., ff. Tr. 5717, at 9.

703. A loss of offsite power will not affect the availability of buses because a dispatcher remains on duty regardless of a power outage, and bus drivers will not be contacted by electrically operated dispatch radios. All bus drivers are LERO workers and will report to staging areas to receive their instructions before picking up the buses. Cordaro et al., ff. Tr. 5717, at 9.

704. Accordingly, the Board finds that the lack of provisions in the LILCO Plan for backup power supplies to ambulance and bus companies will not jeopardize the public health and safety.

Special Facilities (96.B)

705. Contention 96.B asserts that evacuation of hospitals, nursing homes, and facilities for the handicapped could not be accomplished were there a loss of offsite power because these facilities do not have a backup power supply. We find for LILCO on this Contention.

706. First, LILCO is not required by NRC regulations or NUREG-0654 to provide backup power to special facilities in the community.

707. Second, the three hospitals in the EPZ, and eight of the ten nursing and adult homes in the EPZ, have emergency backup power due to the nature of the care they provide to their residents. Cordaro et al., Tr. 5/10/84 Vol. II, at 27-28. The two adult homes that do not have emergency backup power have battery packs to provide emergency light by which to move patients out of the building in an evacuation. Id. at 28. Four of the ten nursing and adult homes have elevators that will run on emergency power, and four others have no elevators. Id. at 28-29. In addition, most, if not all, of the residents in the adult homes without backup power for elevators are ambulatory and can walk down stairs. Tr. 9081 (Glaser).

708. For the facilities without backup power, loss of power would not make evacuation impossible because flashlights and other portable lights could be used to provide enough light to evacuate. Cordaro et al., Tr. 5/10/84 Vol. II, at 29. The ambulances, ambulettes, and buses used to transport residents of these facilities would not be affected. Id. at 28.

Residential Lighting, Public Streetlights,
Service Stations, and Traffic Signals (96.C)

709. There is no regulatory requirement that emergency plans provide backup power for residential lighting, streetlights, service stations, or

traffic signals. Cordaro et al., ff. Tr. 5717, at 6; Tr. 14,578 (Kowieski, McIntire). The LILCO witnesses testified that they are unaware of any radiological emergency plan that includes special provisions for such backup power supplies. Cordaro et al., ff. Tr. 5717, at 7; Tr. 5723 (Robinson). In addition, we have found no case in which a board determined that such backup power supplies were required. Requiring backup power sources for residential lighting, streetlights, service stations, and traffic signals would constitute a major reworking of the community; such is not contemplated by the regulations or guidelines. Cordaro et al., ff. Tr. 5717, at 6-7; Tr. 5719-23 (Robinson).

710. The loss of residential and street lighting might slightly delay the mobilization of some evacuees, see Tr. 14,300 (McIntire), but that would not significantly affect their ability to evacuate. Cordaro et al., ff. Tr. 5717, at 9-10; Tr. 5737-38 (Robinson). People generally have some secondary source of light in their homes, such as flashlights or candles. Id. In fact, LILCO sends out a bill enclosure advising people to prepare for storms and power outages by taking such action as acquiring secondary sources of light in their homes. Tr. 5737-38 (Robinson). Moreover, vehicles have headlights and can be operated effectively without streetlights. Cordaro et al., ff. Tr. 5717, at 10.

711. FEMA witnesses testified that a loss of offsite power to gas pumps would have significant initial effects on evacuation. Baldwin et al., ff. Tr. 12,174, at 99. LILCO witnesses, however, testified that this would not significantly affect the ability of residents to evacuate because LILCO itself would provide fuel and fuel trucks and that, if someone were to run out of

fuel, they could either ride a LILCO bus or ask other evacuees for a ride. Cordaro et al., ff. Tr. 5717, at 10.

712. FEMA witnesses testified that a loss of power to traffic signals during an evacuation would have significant initial effects, such as bottleneck and traffic jamming. Baldwin et al., ff. Tr. 12,174, at 99; Tr. 14,299-300 (McIntire). The LILCO witnesses, however, pointed out that if there is significant traffic flow at an intersection along the evacuation routes in the EPZ, it will be manned by traffic guides. Cordaro et al., ff. Tr. 5717, at 11; Tr. 5738-44 (Cordaro, Robinson, Weismantle). Of the 57 intersections on the evacuation routes with traffic signals, 50 of those are traffic guide posts. Tr. 5739-40 (Cordaro, Robinson). Mr. Weismantle testified that for those intersections not on an evacuation route, loss of power to traffic signals would have very little, if any, effect on the evacuation time estimates. Tr. 5742 (Weismantle). There is no evidence that a loss of power would significantly increase the overall evacuation time estimates.

713. The LILCO witnesses testified that, if evacuation were severely hampered because a severe radiological accident occurred in the middle of the night and were accompanied by a widespread loss of power, the appropriate protective action probably would be sheltering. Cordaro et al., ff. Tr. 5717, at 7-8; Tr. 5726 (Robinson).

714. The Board finds, as a matter of law, that the regulations and guidelines do not require that a radiological emergency plan include provisions for backup power for traffic signals, streetlights, service stations, and traffic guides. The loss of power to these entities would not significantly increase the evacuation time. There is

reasonable assurance that the evacuation would not be sufficiently impaired to jeopardize the public health and safety.

XV. STRIKE BY LILCO EMPLOYEES

715. In July 1984, during the litigation of the emergency planning contentions, all union employees of LILCO went out on an approximately month-long strike. Since two-thirds of the LERO workers are union members, this action raised a potentially serious safety question in the Board's mind about whether a future strike would impair the applicant's ability to implement an offsite response to a radiological emergency. Accordingly, the Board admitted sua sponte the following issues:

- 1) Whether LILCO's ability to implement its offsite emergency preparedness plan would be impaired by a strike involving the majority of its LERO workers.
- 2) Whether LILCO should be required to place the reactor in cold shutdown in the event of a strike by LERO workers.
- 3) Whether placing the reactor in cold shutdown during a strike by LERO workers, after the reactor has operated at full power, would give "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency."

Memorandum and Order Determining that a Serious Safety Matter Exists, at 3 (July 24, 1984). In response, LILCO voluntarily proposed a license condition requiring the Shoreham reactor to be placed in cold shutdown in the event of a strike by LERO members. For the reasons detailed below, the Board accepts the license condition proposed by LILCO and finds that this condition resolves any safety questions about a strike by LILCO union members.

716. Oral direct cases were presented on these issues by LILCO, Suffolk County, and NRC Staff,^{127/} which were cross-examined on two hearing days: LILCO, August 28 and 29, 1984, Tr. 15,435-570, 15,631-46; Suffolk County, August 29, 1984, Tr. 15,598-630; and NRC Staff, August 29, 1984, Tr. 15,652-712.

717. The Board's first issue was answered affirmatively when LILCO stated that it could not demonstrate, under all circumstances, that a strike against LILCO involving all of the union members of LERO would not impair the functioning of LERO. LILCO Ex. 71, at 1-2; see also Tr. 15,599-600 (Minor). This admission does not mean that LERO would be totally disabled by a strike. As LILCO witness Cordaro testified, LERO could theoretically perform many of its functions, including manning the EOC and public information center, broadcasting EBS messages, and activating sirens. Tr. 15,564 (Cordaro). Problems would arise in performing functions such as those of traffic guides and bus drivers, whose ranks are composed almost entirely of union members. Id. NRC witness Sears testified that union workers might well perform their LERO duties despite a strike; as support, he read a statement he had received from the business manager of one of LILCO's unions which indicated that the LILCO unions considered LERO assignments to be voluntary activities outside the collective bargaining agreement. Tr. 15,700-02 (Sears).

^{127/} LILCO's testimony was presented by Dr. Matthew C. Cordaro, Dr. Elias P. Stergakos, Mr. John A. Rigert, and Mr. John A. Scalice; Suffolk County's testimony was presented by Mr. Gregory C. Minor; NRC Staff's testimony was presented by Mr. Robert A. Benedict, Mr. Marvin W. Hodges, Mr. John R. Sears, and Mr. Theodore R. Quay.

718. In response to the Board's second issue, LILCO proposed a license condition that would commit LILCO to bring the Shoreham plant to cold shutdown during a strike by LILCO unions. That condition reads as follows:

PROPOSED LICENSE CONDITION

So long as LILCO shall rely on an offsite emergency response organization consisting entirely or primarily of LILCO employees, then in anticipation of the commencement of a strike by a union representing LILCO employees, LILCO shall bring the Shoreham Nuclear Power Station (SNPS) to cold shutdown condition using normal operating procedures. LILCO shall commence bringing SNPS to cold shutdown condition 24 hours prior to the commencement of such strike, or immediately upon receipt of less than 24 hours' notice of the impending commencement of a strike, with the goal of having the plant in cold shutdown condition by the time the strike commences. LILCO shall maintain SNPS in cold shutdown condition until the end of the strike except that, with the prior approval of the NRC Staff upon review of written application by LILCO, LILCO shall be permitted:

- (1) to take the reactor to a refueling mode to conduct refueling or other operations requiring access to the reactor core if it is shown that such operations cannot result in the occurrence of any events requiring offsite emergency response capability; and
- (2) to conduct such other operations as the Staff shall approve if it is shown that the strike does not, in fact, impair LILCO's ability to implement its offsite emergency preparedness plan.

This condition shall terminate at such time as any or any combination of agencies of the Federal, New York State, or Suffolk County governments shall provide to the NRC written notice of its or their agreement, under terms and conditions approved by FEMA, to assume legal responsibility for effectuation of offsite emergency response for Shoreham Nuclear Power Station.

LILCO Ex. 71, at 3-4.

719. In a letter to the Board, dated September 11, 1984, the NRC Staff accepted this proposed condition as adequate. Suffolk County witness

Minor did not accept the proposed condition, arguing that it was "very broad and vague." Tr. 15,605 (Minor). Specifically, Mr. Minor expressed concern that clear definitions had not been provided for the beginning of a strike, its ending, or the two exceptions provided in the condition. Tr. 15,605-09 (Minor). The Board has reviewed the proposed condition and finds it to be clear as to its requirement that Shoreham be brought to cold shutdown and maintained in that condition during a strike by LILCO union members. The only exceptions to this requirement are conditioned on written submissions by LILCO and prior approval by the NRC Staff, on the basis of absence of risk to the general public. Since this risk decision can be made using a definite standard -- namely, whether protective action guidelines are exceeded -- this is a determination that can be left to the Staff.^{128/}

720. Resolution of the Board's third issue and ultimate acceptance of LILCO's proposed condition requires an examination of: first, the ability of non-union licensed operators to bring the Shoreham plant to cold shutdown and maintain it in that condition during a strike; second, the potential accidents that could occur at cold shutdown and their radiological consequences; and finally, the need for an offsite organization given those hypothetical accidents. LILCO and NRC Staff witnesses agreed that non-union licensed operators could bring the plant to cold shutdown and maintain it in that condition throughout a strike regardless of its duration. LILCO Ex. 73, at 4-5; Tr. 15,444 (Scalice), 15,657-59 (Benedict). Suffolk County witness Minor did not

^{128/} See Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), LBP-82-39, 15 NRC 1163, 1216 (1982); Cincinnati Gas & Electric Co. (Wm. H. Zimmer Nuclear Power Station, Unit 1), LBP-82-48, 15 NRC 1549, 1578 (1982).

disagree with these conclusions. Thus, the Board finds that LILCO could safely bring the Shoreham plant to cold shutdown and safely maintain it in that condition during a strike by its union employees.

721. Discussions of the types and consequences of radiological emergencies that could result from a requirement that Shoreham be brought to cold shutdown focused on two modes of reactor operation: first, accidents that could occur during the transition from full power to cold shutdown; and second, accidents that could occur during cold shutdown. All parties agreed that accidents could occur during the transition to cold shutdown that could result in offsite doses in excess of the Protective Action Guidelines (PAG) limits. Tr. 15,477 (Cordaro), 15,600-01 (Minor), 15,671 (Hodges). These accidents were addressed in the proposed license condition. The condition requires LILCO to start bringing the plant to cold shutdown 24 hours before the walkout of LILCO union members. All parties have agreed that the Shoreham plant can be brought to cold shutdown in 12 to 16 hours, or even faster if necessary. LILCO Ex. 73, at 4; Tr. 15,662-63 (Hodges), 15,612-13 (Minor). Thus, the Shoreham plant would be in a cold shutdown condition prior to a strike by LILCO union members; if an accident were to occur during the descent to cold shutdown, the entire LERO organization would still be in place and able to respond to the emergency.

722. With regard to accidents that could occur during cold shutdown, there was general agreement that none of the accident sequences considered in Chapter 15 of the Shoreham FSAR would lead to offsite doses in excess of the PAG limits if the plant were in cold shutdown. LILCO Ex. 72, at 3-4; Tr. 15,663-64 (Hodges); see 15,618-19 (Minor). With regard to potentially more

severe, degraded core accidents, LILCO witnesses testified that no credible sequence of events could lead to a degraded core during cold shutdown. Tr. 15,447 (Rigert).^{129/} NRC witness Hodges commented that degraded core accidents during cold shutdown were possible, but of small likelihood given the multiple failures that would need to occur and the significant amount of time available for corrective actions. Tr. 15,665 (Hodges). A closer review of the record reveals that LILCO and the NRC Staff have reached essentially equivalent conclusions; LILCO's use of the phrase "not credible" rests on a judgment that while accidents are theoretically possible, their probability is so low as to make them not credible. See Tr. 15,448 (Rigert), 15,460-61 (Cordaro).

723. Mr. Minor's direct testimony lacked any factual discussion of accidents that could occur during cold shutdown or their consequences. Instead, Mr. Minor argued that LILCO had not considered a complete set of accident sequences. Tr. 15,603-04 (Minor).^{130/} Mr. Minor admitted he was aware of no PRA scenarios for Shoreham or for any other plant that originated with a plant in a cold shutdown condition and resulted in substantial

^{129/} This conclusion was premised on the facts that at cold shutdown, the reactor is subcritical, depressurized and at a temperature less than 200° F, and that many systems have been isolated from the reactor. In addition, at cold shutdown the heat production rate is very low, and accordingly, the time to mitigate any potential event is greatly increased and the required capacity of any mitigation system is greatly reduced. Tr. 15,447-48 (Rigert).

^{130/} The studies suggested by Mr. Minor go far beyond those contemplated in NUREG-0396. Indeed, the Task Force, which produced NUREG-0396, stated that it was not suggesting that specialized planning considerations involving degraded core accidents "ought to be excessively burdensome." NUREG-0396, p. III-2. If accepted, Mr. Minor's suggestion of a detailed study of degraded core accidents clearly would be.

offsite doses. Tr. 15,618-19 (Minor). The Board concludes that it is highly unlikely that an accident could occur at cold shutdown that would produce consequences exceeding the PAG limits, and hence possibly requiring an offsite emergency response organization.

724. Having found factually that degraded core accidents at cold shutdown are extremely remote, the legal question whether the proposed condition is acceptable must still be resolved. Although the Commission regulations require that there be "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency," 10 C.F.R. § 50.47(a)(1), the regulations provide no specific guidance on how this "reasonable assurance" standard should be applied to the special question facing this Board.

725. Some general guidance can be found in NUREG-0396 and in 10 C.F.R. § 50.47(d) -- which provides the one express exception to the Commission's emergency planning requirements. NUREG-0396 clearly indicates that the NRC emergency planning requirements are not premised simply on the most severe and most improbable reactor accidents. NUREG-0396 at III-3. Instead, NUREG-0396 indicates that a spectrum of accidents should be considered in developing an emergency plan, *id.* at 4-5, and that more severe core-melt accidents should be considered for the limited purpose of assuring that some capacity exists to reduce their consequences, *id.* at 1-9. In NUREG-0396, it is clearly recognized that PAG limits could be exceeded at the 10-mile EPZ boundary in certain highly improbable, severe accidents, *id.* at 1-5, 1-9; yet, these accidents were not used to extend emergency planning requirements. In exempting low-power testing (less than 5% power) from

emergency planning requirements, 10 C.F.R. § 50.47(d), the Commission recognized that the remote probability of accidents with offsite consequences in excess of the PAG limits did not trigger the need for an offsite emergency response plan. The Commission's decision was based on three^{131/} factors: first, the fission product inventory is much lower during low power testing than during full power operation; second, at low power there is a significant reduction in the required capacity of systems designed to mitigate the consequences of an accident; and third, the time to mitigate an accident is much longer than at full power. 47 Fed. Reg. 30,233 (1982). Thus, the "reasonable assurance" standard of 10 C.F.R. § 50.47(a)(1) can be met without an offsite emergency response plan at less than or equal to 5% power even if some hypothetical accidents occurring at these power levels produce calculated doses in excess of the PAG limits. See Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), CL1-83-10, 17 NRC 528, 533 (1983) (10 C.F.R. § 50.47 "does not require dedication of resources to handle every possible accident that can be imagined.").

726. Alternatively, the Board could judge LILCO's proposed condition under the traditional test for granting an exemption or license condition: namely, whether the proposed condition poses an undue risk to public health

^{131/} An additional factor weighs in LILCO's favor. In enacting the low-power emergency planning regulation, the Commission acknowledged that there may be slightly higher risks during low-power testing due to the plant operators having less experience with the plant at this stage and with a potential for undiscovered design and construction defects. But this risk was significantly outweighed by the lower fission product inventory, lower required capacity of systems, and greater time available for taking action in an emergency. 47 Fed. Reg. at 30,232-33 (1982). In the case of the Shoreham strike issue, the slightly higher risks that weighed against the low-power regulation are not present.

and safety.^{132/}

727. Judged against either of these standards, LILCO's proposed license condition is acceptable. The record in this proceeding indicates that the risks associated with accidents at cold shutdown are extremely remote. In addition, as time passes following the attainment of cold shutdown, existing fission product inventory and decay heat decrease, further lowering the already remote probability of degraded core accidents. Should an improbable degraded core accident occur, at least one-third of LERO would still be available to perform emergency duties. Thus, some capacity would still exist to reduce the consequences of degraded core accidents, and the intent of the Commission's regulations would be met.

728. Finally, a comparison of the conditions at 5% power testing and at cold shutdown after full power operation is illustrative of the relative safety

^{132/} The test for granting an exemption or license condition has recently been clouded, with respect to the backup AC power sources at Shoreham, by the Commission's decision in Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), CLI-84-8, 19 NRC ____ (May 16, 1984). In that decision, the Commission appeared to adopt an "as safe as" test for exemptions and license conditions, at least on the specific issue before it. A subsequent request by the NRC Staff for clarification of that decision has caused the Commission to clarify its order. That clarification stated that:

For the near term the staff [should] read the Shoreham decision as applying to Shoreham only and thus [should] continue with its past practice in authorizing exemptions and imposing license conditions on licensees in accordance with existing regulations.

Letter, Chalk to Dircks and Plaine, July 27, 1984. The Board reads the "Shoreham only" reference as applying solely to LILCO's low power exemption request and not to this emergency planning proceeding. Thus, the Board will apply the traditional "no undue risk" standard instead of the "as safe as" standard, although, as is noted below, LILCO's proposed license condition would also meet an "as safe as" standard.

of the cold shutdown condition.^{133/} Analyses performed by LILCO showed that the fission product inventory of halogens and inert gases at cold shutdown is initially higher than the inventory during 5% power testing. As time passes, this relationship reverses. See LILCO Ex. 81; Tr. 15,631-34 (Stergakos). The times available to mitigate any accident are similar at 5% power and at cold shutdown. Tr. 15,542 (Rigert), 15,688-90 (Hodges). The opportunities for challenge to safety systems are less during cold shutdown than at 5% power, Tr. 15,545-46 (Rigert), 15,622 (Minor), and there are more systems available to respond to an accident at cold shutdown than at 5% power, Tr. 15,690 (Hodges). These considerations led NRC Staff witnesses Sears and Hodges to conclude that cold shutdown was substantially as safe as 5% power testing. Tr. 15,700 (Sears), 15,705-06 (Hodges).

729. For the reasons outlined above, the Board concludes that operation of the Shoreham plant with the conditions printed at [Paragraph XV.4] above will adequately protect the health and safety of the public against the potential risks associated with a strike involving LERO members.

Respectfully submitted,

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^{133/} The Board recognizes that this is not a perfect comparison, but it does serve as a means of judging whether a cold shutdown condition poses an undue risk to public health.